



# Varieties of Linguistic Economy. Essays on Scope and Binding

Andrei Nasta

This dissertation is submitted for the degree of  
*Doctor in Philosophy*

University of East Anglia  
School of Philosophy  
September 2014  
–revised–  
April 2015

This copy of the thesis has been supplied on condition that anyone who consults it is understood to recognise that its copyright rests with the author and that use of any information derived there from must be in accordance with current UK Copyright Law. In addition, any quotation or extract must include full attribution.

# ABSTRACT

## STRUCTURE AND ARGUMENTS

The main body of the thesis is divided in three parts, each comprising two chapters. In the first part, I address the notion of scope from the perspective of linguistic economy, by discussing the drawbacks of an economy-based account of scope, and then I put forward an alternative account. In the second part, I apply a similar strategy, this time, with respect to binding. In the third part, I explore the theoretical consequences of the standard economy principles for two theses concerning, respectively, the nature of complex demonstratives and the purported logicity of natural language.

### Introduction

I start with an introductory study of the so-called *trans-derivational* principles in generative linguistics. These principles are the predecessors of economy principles. I then show how similar principles emerge in more recent economy-based accounts, and point out that the economy principles are meant to serve two main theoretical purposes. They are meant to offer a novel general framework for thinking about linguistic phenomena (such as binding and scope). At the same time, some other theorists consider that the economy principles serve the interface between syntax and semantics/pragmatics, being aimed at harmonising certain syntactic and pragmatic requirements. I embrace both these theoretical purposes—generality and pragmatism—and make them the desiderata for proper economy-based accounts of scope and binding.

I rehearse other themes that will be important throughout the thesis. One such theme concerns the semantic values of expressions that enter a binding relation. Any account that takes seriously economy principles needs to posit that noun phrases have a denotation which is more fine grained than individual referents. Thus, the proper denotations of noun phrases should be guises, semantic values that contain descriptive material and refer to objects in the domain through such descriptive material. Another important theme, implicit throughout the thesis, concerns the logicity of grammar. I thus devote a chapter in order to spell out why linguistic economy implies logicity, and why logicity is an important feature of grammar.

## Part I (chapters 1 and 2): Scope Economy

The two chapters of Part I deal with principles of economy governing scope. Intuitively, the scope-property is what allows us to read the sentence *Someone loves everyone* in two ways. One implies that there is only a person who loves everyone; the other implies that there may be several persons who, taken together, love everyone. A principle of scopal economy decides which of the (in principle available) scopal interpretations of a sentence are grammatical by putting the scopal interpretations in *competition* with each other. According to a standard principle of economy (Fox 2000), a scopal reading of a given sentence should be discarded in case it does not say anything new in terms of its truth-conditional content—i.e., in terms of what the world has to be like for that sentence to be true—compared to its alternatives. Further, a *strong* principle of economy is one that not only rules out truth-conditionally vacuous scopal structures (or logical forms), but also informationally strong scopal structures, i.e., structures that entail the alternative scopal reading (Mayr and Spector 2010). In the first chapter, I argue that this strong economy principle is problematic from many points of view: it is based on problematic assumptions about the entailment patterns between the scopal readings, has a host of counterexamples, and suffers from lack of conceptual motivation.

However, the basic theoretical idea behind the strong economy account that there is a systematic relation between semantic strength and scopal possibilities, is worth pursuing, and this is what I do in the second chapter. There, I argue that the good predictions of the strong economy account can be obtained pragmatically, by utilising, *inter alia*, a mechanism geared towards discovering contradictions and something along the lines of the cooperative communication maxims advanced by Grice (1967/1989).

The most central maxim is the Gricean maxim of quantity. Very roughly, the quantity maxim requires that if someone utters a sentence which is ambiguous between a stronger and a weaker meaning, what is in fact conveyed is the weak meaning taken together with the negation of the stronger meaning. (An assertion is stronger than another if it entails it.) Among the fruitful linguistic developments based on the maxim of quantity is the notion of scalar implicature. The basic idea of a scalar implicature can be illustrated by a simple example. In saying *Some students are in the classroom* one usually implies (viz. implicates), by default, that *not all* the students are there, and thus conveys that *some but not all* students are in the classroom. Implicatures are not categorical; they can be cancelled, as, for instance, in case that the person above just wanted to draw a logical inference from *all students are ...* to *some students are ...*, assuming that the former is true.

My contribution is to propose a novel mechanism which is geared toward checking contradictions, which, in turn, appear in the interaction between logically possible scopal readings and their scalar implicatures. This amounts to offering an essentially semantic and pragmatic implementation of the principles of scope economy (thus pushing further several insights gleaned from Reinhart 1983a, 2006). I shall also show that the general outlook of the resulting account diverges in important respects from a pragmatic account relying on cooperative communication.

## Part II (chapters 3 and 4): Binding Economy

The next two chapters (chapters 3 and 4) focus on binding. In the most standard form, binding is a relation of referential dependence of pronouns on names, as e.g. in *Sadie knows she is talented*, where *she* refers to Sadie in virtue of its referential dependence on the name *Sadie*.

Part II has the same structure as the previous part of the thesis. In the third chapter, I present the shortcomings of some representative economy principles of binding, and, in the fourth chapter, I put forward an account that is better than the standard economy-based accounts in terms of the two criteria, generality and pragmatism. Thus, I start by criticising previous uses of the interface principles of economy. I base my objections on two study cases consisting of extensions of the interface economy principles (*de se* pronouns and copular sentences), and argue that these principles of economy are problematic because they are insensitive to semantic payoffs, and are prone to overgeneration. I will also draw a more general sceptical conclusion. My contention is that the interface principles of economy have not proven to be theoretically useful, since they seem to be explanatorily marginal, and they also lack pragmatic motivation. Therefore, the economy principles fail on both (generality and pragmatic) counts.

In the fourth chapter, I adopt, and improve on, a semantic account of binding, which is based on a principle of denotational (rather than truth-conditional) economy called *Non-Redundancy*, due to Schlenker (2005). An important intuition behind the denotational principle of economy is that the economy ‘competitors’ are not propositions (viz. the meanings of entire sentences) but the denotations of noun phrases. Moreover, this principle is formulated only in terms of the meanings/denotations (i.e. the semantics) of linguistic constructions realising binding rather than in terms of both their syntax and semantics (like its truth-conditional predecessors advanced by Fox 2000; Reinhart 1983a, 2006). I extend the data coverage of the semantic account by handling (i) the ‘Madame Tussaud’ type of violations of Condition A of Binding Theory (see Jackendoff 1992), and (ii) phenomena involving logophoric and *de se* pronouns. In particular, I shall extend

the use of Fregean senses (or guises). Accordingly, I consider that not only noun phrases can take guises as semantic values, but also more complex expressions, such as complex predicates and clauses (cf. Heim 1998). I thus show how to deal with the conditions A, B, and C effects within the denotational account. I also come back to the two case studies (*de se* pronouns and copular sentences), arguing that if we assume that binding theory is not sensitive to the *de se/de re* readings and give up an assumption about the difference between coreferential readings of specificational and predicational copular sentences, we get straightforward (semantic economy) analyses of the two case studies.

Thus, the denotational economy account can be seen as a generalisation of truth-conditional economy, but one that lacks the troublesome ‘interface’ characteristics.

The positive role of the first two parts of the thesis is to lay out several descriptive hypotheses about some aspects of scope and binding, based on linguistic economy considerations and other natural assumptions. I argue that the ensuing pictures are conceptually very appealing and *prima facie* empirically adequate, although the exploration of their full empirical consequences should be left for future work.

### Part III (chapters 5 and 6): Consequences on Definites and Logicality

The negative role of the first two parts of the thesis is to point out the inadequacies of the *interface* principles of economy. However, I do not mean to suggest that the standard economy accounts are completely misguided. Setting aside their ‘interface’ characteristics, the standard principles of economy have some empirical success. They also point to some fruitful explanatory strategies in theoretical linguistics. Given these positive features of the standard economy principles, and their legacy in the recent history of generative linguistics, I claim that the standard economy principles lend some support to theses about several, theoretically important, properties of grammar.

In particular, assuming truth-conditional economy, I argue, *contra* Glanzberg (forthcoming[b]) and Szabó (2012), (i) that this principle directly implies a close relation between logic and natural language, and (*contra* a proposal presented by Dever 2001) (ii) that this principle also undercuts what I shall call *the argument from scope* against the non-referential views of complex demonstratives. (Non-referentialism is taken to deny the direct reference thesis, which has it that certain noun phrases refer directly rather than *via* a description.) I further propose novel economy-based arguments for a non-referential constraint on the semantics of complex demonstratives (a constraint that seems to be independently supported, cf. Elbourne 2008, 2013). Thus,

if the linguistic economy thesis is on the right track, complex demonstratives (and other definites) are non-referential expressions; they do not directly refer to individual objects.

The main purpose of these two chapters is to show that logical properties of grammar, as well as the non-referentiality of definites are both explanatorily desirable.

## SUMMARY

My main contributions in this work are the following. In the first two parts of the thesis, I criticise two accounts of the linguistic economy of scope and binding, drawing attention especially to their conceptual shortcomings. I further propose alternative accounts that overcome the shortcomings of their predecessors. In particular, in chapter 2, I establish a novel connection between scope and scalar implicatures and, in chapter 4, I develop a semantic account of binding by improving the empirical coverage of the principle of denotational economy. The main conclusion of the first two parts of the thesis is that we should reformulate the accounts based on linguistic economy in terms of semantic and pragmatic principles. If we do so, our accounts of scope and binding will gain both empirical and conceptual advantages.

Finally, in chapters 5 and 6, I draw some substantive consequences for the semantics of complex demonstratives (and other definites), and also for the purported logicity of binding and scope constructions, relying on principles of linguistic economy. More concretely, I argue based on truth-conditional economy that complex demonstratives are best conceived as non-directly referential. In the final chapter I demonstrate that linguistic economy entails logicity of natural language, and that the arguments to the contrary are faulty.

# CONTENTS

0	INTRODUCTION	1
0.1	Outline	1
0.2	Main themes	3
0.2.1	Economy: origins and methodology	4
0.2.2	Pragmatics	10
0.2.3	Guises	13
0.2.4	Logicity	15
0.3	Outlook	19
i	ECONOMY-BASED ACCOUNTS OF SCOPE	21
1	STRONG SCOPE ECONOMY PROBLEMS	22
1.1	Introduction: scope and economy	22
1.2	Motivation for an alternative	28
1.2.1	Non-emptiness implications	28
1.2.2	Problematic predictions	36
1.2.3	Defence strategies and their key drawbacks	47
1.3	Conclusion: a deflationary solution	49
2	A CONTROVERSY-BASED PERSPECTIVE ON SCOPE SALIENCE	52
2.1	Introduction: economy	52
2.2	Stronger pragmatics: scope admissibility	53
2.2.1	A pragmatic reinterpretation of the original ‘strong economy’ data	55
2.2.2	Extending the pragmatic account to the previously problematic data	63
2.2.3	Empirical issues	70
2.3	The controversy-based account	72
2.3.1	The roles of contradiction	72
2.3.2	Pragmatism and Controversy	75
2.3.3	Implementations and Challenges	79
ii	ECONOMY-BASED ACCOUNTS OF BINDING	85
3	BINDING ECONOMY PROBLEMS	86
3.1	Introduction	86
3.1.1	The basic argument	86
3.1.2	Binding and economy	87
3.2	Binding economy: study-cases	89
3.2.1	Economy and the <i>de se/de re</i> distinction	89
3.2.2	Economy in copular constructions	94
3.3	Shortcomings of economy	101
3.4	Conclusion	109
4	A SKETCH OF A SEMANTIC ECONOMY ACCOUNT OF BINDING	111

## Contents

4.1	Binding Economy	111
4.2	Semantic-based economy: main assumptions and data	111
4.2.1	Binding economy data	113
4.2.2	Semantic economy: main assumptions	114
4.3	Extensions of economy	117
4.3.1	Extended Non-Redundancy	118
4.3.2	Against arity-reducers	121
4.3.3	Antecedence	125
4.4	Case studies revisited	128
4.4.1	<i>De se</i> cases	129
4.4.2	Copular sentences and pure identity cases	140
4.5	Concluding remarks	144
iii	FURTHER CONSEQUENCES OF LINGUISTIC ECONOMY	148
5	LOGIC IN NATURAL LANGUAGE	149
5.1	Introduction	149
5.2	Linguistic Evidence	152
5.2.1	A linguistic hypothesis: Binding Economy	152
5.2.2	A sketch of a logic for Binding Economy	155
5.3	Main objections to the LNL thesis	159
5.3.1	Discussion of the arguments from (in)competence and lexicality	161
5.3.2	Discussion of the argument from absolute semantics	162
5.3.3	Discussion of the argument from formality	171
5.3.4	Discussion of the argument from abstraction and idealisation	174
5.4	Concluding remarks	187
6	ECONOMY-BASED ARGUMENTS FOR A NON-REFERENTIAL ACCOUNT OF COMPLEX DEMONSTRATIVES	191
6.1	Introduction: an outline of the argument	191
6.2	Scope and economy	193
6.2.1	The argument from scope	194
6.2.2	Scope Economy and Parallelism	197
6.2.3	The relative scope of negation	201
6.2.4	The relative scope of intensional operators	202
6.2.5	Interim conclusions about scope	211
6.3	Binding and economy	214
6.3.1	Binding conditions, coreference, and economy	215
6.3.2	Condition B cases	219
6.3.3	Condition C cases	222
6.3.4	Interim conclusions about binding	226
6.3.5	Referentialist ways out	227
6.4	Summary and concluding remarks	233
7	CONCLUSIONS	237



## Contents

iv	APPENDICES	251
A	MONOTONICITY	252
B	FURTHER COUNTEREXAMPLES TO STRONG ECONOMY	255
C	CB DEFINITIONS AND PROOFS	257
D	THE CB ACCOUNT: FURTHER APPLICATIONS AND SUMMARY	261
E	LINGUISTIC SURVEY	267
F	LOGICAL PROPERTIES UNDER ABSOLUTIST CONSTRAINTS	273

## LIST OF FIGURES

Figure 1	Contradiction between the surface scope and the inverse scope implicature of a construction consisting of the universal and negation operators. 57	
Figure 2	Contradictions between surface scope and inverse scope implicature of constructions consisting respectively of (i) <i>few</i> and universal operators, and (ii) <i>many</i> and universal operators. 60	
Figure 3	Implicature computation results in contradiction between the surface scope and the inverse scope implicature of a construction consisting of a universal and an existential. 64	
Figure 4	Contradiction in constructions with negation and <i>more than</i> -operators under complete information 65	
Figure 5	Inconsistent surface scopes for constructions with modals and comparatives 68	
Figure 6	The surface scope reading and inverse scope implicature are inconsistent 265	

## LIST OF TABLES

Table 1	The rows that give rise to contradictions between the items in grey contain admissible inverse scopes. According to the controversy-based account, all other things being equal, the quicker the contradiction occurs, the more salient the inverse scope is. 261
---------	---



# INTRODUCTION

## O.1 OUTLINE

The main themes of this thesis are economy-based explanations and the natural language constructions that are amenable to such explanations. I call this type of enterprise *philosophical linguistics*, since it looks at linguistic phenomena from a general conceptual perspective.<sup>1</sup> I see the purpose of this broadly interdisciplinary work to be ultimately systematic in nature, one that starts off by putting a special emphasis on the nuances of language, and tries to work out the high-level principles governing them.

I put forward several descriptive generalisations that concern the interface between semantics and pragmatics and are meant to replace generalisations at the syntax and semantics/pragmatics interface.<sup>2</sup> The work is empirically driven insofar as it characterises linguistic phenomena. It also proposes general directions—in particular, it insists on pragmatics, logicality, and indirectly on a more practice-based philosophical methodology—in the study of linguistic phenomena. However, I am *not* engaged in a foundational project, since my purpose is not to advance novel views about foundational notions of linguistic theory (such as syntax, semantics, pragmatics, and so on), and I shall in general rely on common usages of these notions. Thus, I assume that syntax concerns the form (rather than the content) of expressions, and their distributional properties. Semantics concerns the truth-conditional content of sentences which consists of the situations that make sentences true and the way the situations are composed. Finally, pragmatics concerns how the semantic contents are enriched in order to facilitate an efficient or cooperative communication. To be sure, these distinctions are not as simple as my statements

---

<sup>1</sup> However, this is *not* a standard linguistic work, since I take the liberty to analyse and pull together a wide range of linguistic data at a more general level and without offering either precise syntactic analyses or compositional semantic ones. *Nor* is this a standard philosophy of language work, since my data set of linguistic constructions and inventory of central notions overlaps to a greater extent with those found in theoretical linguistics, and especially linguistic semantics.

<sup>2</sup> Descriptive accounts are usually opposed to explanatory accounts. The notion of explanation—and what distinguishes it from the notion of description—is a difficult one, and it is understudied in philosophy of language and linguistics. While there is some value in taking explanation as the aim of inquiry, we should better get the descriptive generalisations right before engaging with the explanatory part of the inquiry.

could suggest, and further levels or ‘modules’ of grammar are conceivable, and probably necessary. For instance, a key level for our purposes is the semantics/pragmatics interface, which ensures that pragmatics can partly supply the semantics with the objects it needs in order to get to certain semantic, truth-conditional contents. It is difficult to say just by looking at a linguistic phenomenon whether it belongs to the domain of syntax, semantics or pragmatics (or to some interface between them). These aspects of language involve different *explanatory strategies* in terms of specific rules and principles governing form, composition, or extra-compositional mechanisms. Locating a phenomenon at one of these levels turns on how well those explanatory strategies work, according to some standard theory choice criteria (empirical adequacy, simplicity, conceptual naturalness etc.). The latter observation holds, to a certain extent, of other fundamental notions that will be invoked throughout the thesis, specifically of scope and binding.<sup>3</sup>

The thesis revolves around the idea of *linguistic economy*. The notion of economy under discussion is a relatively ‘local’ notion and concerns a stable state of the language of a competent speaker. By these characteristics I mean the following. First, economy is not assumed here to be the result of an evolutionary process, in which linguistic principles are more and more refined in order to be able to tackle, in an ideal (or optimal) manner, the specific computational problems faced by language. Instead, economy is important for the present study insofar as it can teach us something about the properties of the language of a competent speaker. In other words, I am interested in linguistic economy as a synchronic rather than diachronic notion. Second, economy, in the sense understood here, does *not* govern language as a whole—as e.g. the Gricean maxims of cooperative communication, and the neo-Gricean principle of relevance do (Grice 1967/1989; Sperber and Wilson 1986/1995)—but rather operates on a comparatively restricted set of linguistic constructions. We can more aptly see economy as a property of principles that have a very specific purpose, with a very limited memory (or search-space), and with a high sensitivity to the syntactic and semantic characteristics of linguistic constructions. Briefly put, the principles of economy are moderately local. Locality is a matter of degree, and even stricter notions of locality exist (I shall present one shortly). From the perspective of a stricter criterion of locality, moderate locality will appear to be, in fact, a global notion. But regardless of one’s perspective on the

<sup>3</sup> What we take scope and binding to be is tied up with the linguistic phenomena that we are uncovering using some theoretical apparatus or other. This is not, so to speak, to deny the facts, but only to say that they are, to an important extent, sieved through certain theoretical frameworks, and that alternative frameworks can change *how* we take phenomena to be, or even *what* we take the phenomena to be. Although these notions are theory laden, we shall provide relevant illustrations, and aim to state our results even in the absence of an overarching account of the respective distinctions.

locality of linguistic economy, linguistic economy principles are more restricted than pure pragmatic ones. It is in contrast to these overarching pragmatic principles that I find linguistic economy *local*, even if, within this category, more or less local/global sub-categories may be defined. Note that the two senses of economy just introduced overlap: moderately local economy is a synchronic notion. Henceforth, linguistic economy (of any variety) will be always understood as *local synchronic* economy. I shall use the “local” qualification of economy in a more restricted sense, to refer to a species of locality, and I shall oppose this species to another one, namely, ‘globality’.

The thesis is organised in three major parts, which deal with economy principles and linguistic economy phenomena, that is, natural language sentences and constructions that manifest economy features. In the first part I argue for a theoretical reorientation in the way we conceive of economy principles that regulate scope. I propose that these principles should be seen as partly pragmatic (or, as I shall put it, semantic/pragmatic). A similar argument regarding binding will be put forward in the second part of the thesis. In the third part I exploit the standard economy principles and phenomena in order to argue for two general claims concerning language. The first claim concerns a particular type of noun phrase: complex demonstratives. I argue that, in view of several principles of economy, complex demonstratives should be treated as non-referential. The second claim concerns a structural property that (I argue) is implied by the principles of economy. In this connection, I show that linguistic economy implies that certain mechanisms at the interface between syntax and semantics involve some substantial logical properties.

There are four main themes that can be distilled from the present work. The theme that will be most prominent in the first part of the thesis concerns the advantages of adopting a more *pragmatic* approach to economy phenomena. In the account of binding developed in chapters 3 and 6, I shall posit that the semantic values of noun phrases are *guises*, so the notion of guise also deserves a place in this introduction. The third theme is the *logicality* of natural language (argued for in chapter 5). The fourth theme concerns *methodological* considerations in linguistic argumentation (covered throughout the thesis, and especially in chapters 1 and 3). In what follows, I shall introduce these themes, situating them in a wider theoretical context.

## O.2 MAIN THEMES

In what theoretical sense is a fragment of natural language *economical*? In answer to this question I propose that linguistic constructions are economical in virtue of some linguistic property that is ranked higher (according to a specific metric or scale) than other properties

of alternative linguistic constructions. Perhaps an even more general answer is that linguistic economy decides whether certain grammatical properties hold of a linguistic construction by way of ranking this construction relative to alternative constructions. In the next section I illustrate the basic notions of economy, and discuss their methodological role in linguistic theory. I then move to the other main themes of the thesis: *pragmatics*, *guises*, and *logicality*. In order to situate the inquiry into linguistic economy in the broader linguistic literature, I shall also go through a series of important paradigms of linguistic explanation. These will illuminate the key aspects of linguistic economy phenomena that I shall try to refine in the rest of the thesis.

#### 0.2.1 Economy: origins and methodology

Economy principles—or what I have called above *local synchronic economy*—originated as a specific type of constraint on grammars. Grammatical constraints can be relevantly divided into local and global (which, in turn, are subdivisions within the larger category of local synchronic economy). The *local* constraints concern rules and principles that apply within a single derivation or construction of a linguistic unit (sentence). In contrast, *global* or trans-derivational constraints concern multiple derivations. Global constraints are formulated in terms of what alternative derivations look like. Thus, the grammatical rules/principles governing a structure may depend on the inherent properties of that structure (local properties), or on the properties of other structures, perhaps relative to the structure in hand (global structures). Hence, the intuitive idea behind the local/global division is captured by the distinction between inherent and relative properties.

Economy principles were originally motivated primarily by appeal to methodology (and, as we shall see in the forthcoming discussion, they still should be methodologically motivated).<sup>4</sup> That is, these principles were initially supposed to render grammar more general, more elegant and simple, less *ad hoc* and to make linguistic theory more empirically fruitful and tractable. In more linguistic terms, economy principles were originally designed to remove the need for construction-specific rules, and to give instead structural accounts of several phenomena that resisted systematic explanation. A structural account appeals to the properties of a larger linguistic construction (e.g. a sentence, or part of a sentence) rather than to the particular lexical items (words) or sub-constructions making up that construc-

<sup>4</sup> Independently of whether simplicity and generality were the initial rationale for linguistic economy (a claim that needs more exegetical work than I'm able to produce here), it is incontrovertible that simplicity and generality are among the criteria of theory choice more generally, so it is reasonable to assume the same criteria for linguistic theory as well.

tion. The structural accounts based on economy were put forward in order to replace construction-specific rules, and to illuminate the relevant linguistic phenomena in a way consistent with the theoretical virtues of simplicity, generality, and so on.

How can an economy principle gain the required generality? Let me illustrate with an important example from the recent history of generative linguistics. An economy condition advanced in linguistic theory in the '90s is the Minimal Link Condition. The Minimal Link Condition (MLC) requires that given two convergent (i.e. grammatical) linguistic forms (or, in linguistic parlance, derivations)  $F_1$  and  $F_2$  which are formed from the same set of lexical items,  $F_1$  will block  $F_2$  if its 'links' are shorter. The links here may refer to the length of movement or other operations/configurations that are intuitively definable in terms of the distance between nodes in a linguistic tree. Reinhart (2006, p. 15), drawing on Chomsky, presents a number of examples in order to illustrate the main data that can be explained by appeal to MLC. Chomsky (1973) introduced such cases under the name *superiority*, which was meant to reflect the fact that only the *wh*-expression that occupies a higher or superior position in the syntactic tree (or the leftmost in the linear order of the sentence) can be displaced.<sup>5</sup>

1. *Superiority* (case 1)

- a) Who  $t$  discussed what with you?
- b) ??What did who discussed  $t$  with you?

2. *Superiority* (case 2)

- a) Whom did Lucy persuade  $t$  [PRO to visit whom]?
- b) \*Whom did Lucy persuade whom [PRO to visit  $t$ ]?

These examples involve *wh*-movement, that is, movement of *wh*-expressions such as *what*, *who*, *how* etc.. Movement is generally assumed to leave behind traces (unpronounced items represented by  $t$ ), which mark the initial position of the moved phrase, as well as the intermediary stopping or landing positions of the moved phrase. These positions are relevant for how we interpret the questions. *Wh*-phrases are one of the primary motivations for positing the movement operation. For instance, *What did Lucy see?* is obtained, on common theoretical assumptions, by moving the *what* from the object position (after *seen*) to the front of the sentence; in doing that, we obtain the right configuration for a grammatically correct question. The movement analysis rests on the basic assumption that the underlying structure of the previous question is *Lucy did see what?*. (Note that

<sup>5</sup> I follow the conventional notation that represents the unacceptability of a linguistic example with \* and different degrees of deviance with ?, and ??.



we can sometimes ask questions using the latter construction, thus presumably using its underlying structure.)

As we shall see shortly, other expressions can also move. For now, what is striking regarding *wh*-movement is that not all *wh*-expressions can be freely moved, as shown by (1b) and (2b). We can explain why the movement of *wh*-expressions is unavailable by appeal to minimal links. They cannot move because their movement would be too long. There are shorter links available from the same numerations (i.e., sets of lexical items forming a given sentence), and only these links are allowed. A natural way to think about how MLC is computed is as follows. We fix a numeration, e.g. the numeration corresponding to (1a), and form a set of two linguistic forms realising different movement operations. From this set—also called a reference-set—we choose the linguistic form that realises minimal links. This implementation of MLC is thus based on *competition* between linguistic forms.

It was suggested that MLC (or a similar principle) can explain the behaviour of many other constructions consisting of *wh*-expressions.

3. *Relativised minimality* (Reinhart 2006, p. 19)

- a) \*Where find<sub>t</sub> Max will t the book. *head movement*
- b) \*Max<sub>t</sub> seems [that it is certain [t to arrive]]. *A-movement*
- c) \*I wonder what<sub>k</sub> you forgot from whom<sub>i</sub> you got t<sub>k</sub> t<sub>i</sub>.  
*A'-movement (wh-islands)*

In these examples we observe the same tendency towards shortest movements. In (3b), for instance, the noun phrase *Max* cannot move on a longer path in order to satisfy the need for a subject in the main clause leaving the expletive *it* satisfy the same role in the secondary clause. That role can be fulfilled in the main clause only by the expletive. This has the effect of minimising the movement of the noun phrase. The same tendency can be seen in (3c). There, the restriction is on the movement of *wh*-phrases.

Another similar phenomenon can be noticed in the following example.

4. *Wh-islands* (Carnie 2007, pp. 337-8)

- a) I wonder what<sub>i</sub> John kissed t<sub>i</sub>.
- b) Who<sub>k</sub> did you think t<sub>k</sub> kissed the gorilla.
- c) \*Who<sub>k</sub> did you wonder what<sub>i</sub> t<sub>k</sub> kissed t<sub>i</sub>.

The *wh*-expression *what* can move independently, as testified by (4a). The acceptability of (4b) shows that the *wh*-phrase *who* can also move independently. A problem appears in (4c) when we try to move both *wh*-expressions. This problem can be traced back to the length of movement, under a particular understanding of the notion of length. More specifically, if we measure the length according to the number

of potential landing sites for a *wh*-expression, then it follows that *who* in (4c) is required to travel a lengthier path in order to front the sentence in (4c). That is intuitively the reason why the resulting construction is deviant.

We can thus see a common pattern in these examples. It is tempting to try to incorporate these examples into the MLC, that is, the principle of economy which prevents linguistic forms from manifesting long movement. This is one of the economy principles that played, and still plays, an important role in linguistic accounts. Other economy principles and corresponding economy metrics (apart from the length of movement specific to MLC) have been suggested.

Another important principle is one that disallows a grammatical operation from applying in case that operation is not necessary to render the resulting construction, viz. the construction obtained as a result of the application of that operation, grammatical. This latter principle is called a *least effort* principle. The MLC and the least effort principles are distinct in important respects. Only the MLC requires competition between linguistic forms (or derivations). However, they have something in common in that they minimise a certain grammatical property (length of movement, number of operations). Moreover, there are principles that inherit features from both types of economy principles.

Two main principles of economy studied in this thesis—Scope Economy and Binding Economy—resemble the MLC in that they are based on competition between linguistic forms. They also resemble the least effort principles, as they are geared towards preventing the application of a certain operation (or the presence of a certain grammatical configuration) deemed to imply an unnecessary effort. Let me illustrate the main traits of these economy principles with the following examples.

5. a) A student listens to every teacher.
- b) If a student listens to everyone, he<sub>i</sub> must listen to him<sub>i</sub>.

The principles of economy require that certain grammatical operations apply only if some relevant effects are produced as the result of their application. What are these operations? These operations can refer to quantifier movement (as applicable to (5a)) or to an operation that results in two coreferential noun phrases (as indicated in (5b)). According to the economy principles, the grammar allows these operations, and thus the resulting linguistic forms are grammatical, if their effects on the meanings of these forms are significant. In other words, these operations are allowed just in case they produce new meanings, understood as truth-conditional contents.

To illustrate, note that (5a) can be read in two ways. According to one interpretation there is only one student who listens to every teacher. According to another interpretation, there may be several

students who jointly listen to every teacher. The latter interpretation is obtained by way of movement of the quantifier phrase *every teacher* in order to take scope over the existential *a student*. (Much of the recent linguistic research assumes such an operation, and I shall do the same here.) Now, the principle of scope economy allows this operation because it produces a new meaning. Clear evidence for the existence of such a new meaning is the fact that the sentence *A student listens to every teacher* can be taken to entail that there are several students. Because such a new meaning exists as a result of the application of movement, the principle of scope economy allows this application and the resulting form.<sup>6</sup>

Take now (5b), and focus on its second clause: *he<sub>i</sub> must listen to him<sub>i</sub>*. As it is standard, I take the index *i* on the two pronouns to represent sameness of reference, or *coreference* (taken here as a broad and intuitive notion, unlike in chapters 3, 4, and 6). Thus, the two pronouns in the second clause of (5b) refer to the same person, namely the student introduced in the first clause of the same example. The patterns of coreference and disjoint reference are the proper domain of binding theory. From the perspective of the standard binding theory, the fact that coreference is possible at all in (5b) is surprising. This is because coreference is not generally possible. Notice that constructions such as *he likes him*, which seem similar to (5b) in all the crucial respects, are usually interpreted as referring to two distinct individuals, rather than to a single one. (Cf. also *\*He<sub>i</sub> told [a student]<sub>i</sub> to listen carefully*).

However, there is an important detail in example (5b) which can be used to explain the surprising behaviour of the pronoun *him*. The Binding Economy principle was designed to make use of such a detail. In brief, the coreference in (5b) is allowed because it produces a *novel meaning*, and the availability of a novel meaning makes the sentence economical, in a sense to be spelled out below. The basic factor that underlies the novel meaning relies on the distinction between two predicates: *listening to him* and *listening to himself*. These predicates express two distinct properties, and it is the former that produces a novel meaning relative to the latter.<sup>7</sup> In virtue of that novel meaning, Binding Economy allows the unusual coreference pattern, and the corresponding construction in (5b) ends up being grammatical.<sup>8</sup>

<sup>6</sup> We are omitting here the linguistic argumentation in favour of Scope Economy; see Fox (2000) and Reinhart (2006) for extensive argumentation, and the second chapter for an argument for an alternative version of Scope Economy.

<sup>7</sup> Suppose that the student in 5b is Dan. What the second clause of 5b—viz., *he<sub>i</sub> must listen to him<sub>i</sub>*—says is that Dan listens Dan. But note that both the above predicates can be used to describe the same situation. It is thus important from a linguistic standpoint that the properties instantiated by Dan in that situation may differ: on the one hand, Dan may like *a person who happens to be Dan*, and on the other, Dan may like *himself*.

<sup>8</sup> Once again, I leave implicit the full argumentation, as well as the spelling out of the main notions, behind Binding Economy. See the works cited in fn. 6, as well as the

The original theoretical motivations for economy principles were partly empirical and partly methodological. I focus here on the methodological motivations, since methodology will play a key role throughout the thesis. In the minimalist programme, the economy principles were meant to support a general and conceptually natural framework. In that framework, it was proposed that the main principles of the grammar should be integrated to a principle of economy akin to MLC. As Noam Chomsky (1995, p. 161), one of the leading proponents of the minimalist, economy-based framework, has put it, “we may hope to raise these “least effort” [economy] guidelines to general principles of UG [universal grammar]”. He goes on to point out that “these principles have a kind of naturalness and generality lacking in the specific principles of UG such as the ECP, the binding theory and so on”.<sup>9</sup> It is thus worth keeping in mind that theoretical virtues such as simplicity, elegance, and generality are among the main desirable consequences that the economy principles were designed to bring about.

This combination of theoretical desiderata is more widespread. Linguistic economy considerations and the proclivity for simplicity are not features that single out the minimalist programme. As many have noted (cf. D. E. Johnson and Lappin 1999; Pullum 1996), the economy principles originated in the now defunct programme called *generative semantics*. Generative semanticists called these principles *global* or *trans-derivational* constraints. Some of the generative semantics principles resembled the scope and binding economy principles in that they were sensitive to semantic interpretation of linguistic forms (see Lakoff 1971). Moreover, simplicity was always a guideline for linguistic theory<sup>10</sup>, and is, implicitly or explicitly, taken to draw a divide between descriptive approaches and explanatory ones<sup>11</sup>.

Although simplicity is a complicated notion, it is crucial in linguistic practice (and in scientific practice more generally). For this thesis, the notion of simplicity is important because it gives us the means to evaluate the economy-based accounts by their own lights, or, in any case, by the lights of the conceptual and methodological ideas that originally motivated the economy-based accounts. Since the economy principles were explicitly advanced in order to make grammar simpler, I can use simplicity to evaluate the results of the economy-based accounts. My main contention in the first part of this work is that the economy principles do not bring about a simplification of the grammar. Insofar as their empirical predictions can be obtained in other theoretical frameworks, these alternatives are to be preferred. However, I seek to preserve the insights of the economy principles,

---

overview of binding economy approaches in Nasta (2013). For a the development of a pragmatic-based view of binding economy, see chapter 3.

<sup>9</sup> Cf. Chomsky (1995, pp. 1,171,220,228)

<sup>10</sup> Cf. Chomsky (1957, 1965, 1981)

<sup>11</sup> See Safir (2004, p. 60) for an implicit endorsement.

and that is why the alternatives that will be subsequently proposed are still economy-based in important respects.<sup>12</sup>

The methodological virtues of generality and ‘naturalness’ of linguistic hypotheses will also play an important role in chapter 4, where it is argued that definite noun phrases are non-referential. Non-referentiality allows us to see the important similarities between various forms of definite noun phrases, as well as to account for their syntactic and semantic behaviours.

### 0.2.2 Pragmatics

Taking in consideration the syntax/semantic divide, we can classify the previous principles under two types of economy principle. One is purely syntactic; the original MLC was such a principle. The other is not only syntactic but also semantic. In this work, I focus on the so-called *interface* principles of economy, namely the Scope Economy and Binding Economy.<sup>13</sup> As we have seen, the effect that helps evaluate the economy properties of derivations (and grammatical operations) is in fact a semantic (and pragmatic) effect, since the truth-conditional content of a derivation is essential in establishing whether that derivation is grammatically licensed.

I submit that the semantic nature of the interface principles of economy opens up an important theoretical possibility, a possibility that has been so far relatively unexplored in connection to economy principles. More to the point, since the standard economy principles are *partly* semantically and pragmatically motivated, our driving question is whether these principles can receive a *purely* semantic/pragmatic articulation. There are two basic motivations for a purely semantic/pragmatic account of economy phenomena. Firstly, interface strategies—the economy computations at the interface between syntax and semantics—are computationally costly. Secondly, the truth-conditional economy principles seem to be *ad hoc* and questionable from a theoretical point of view.

The pragmatic nature of the economy principles is most clear in Tanya Reinhart’s work (see e.g. Reinhart 1983b, 2006). For her, the pragmatic role of economy takes two forms. One relates to a general theoretical motivation of economy. The economy principles have ulti-

<sup>12</sup> The controversy-based account relies on a mechanism whose main components are scalar implicatures, and the interactions of this mechanism with various pragmatic factors. According to my denotational economy account in chapter 4, which draws primarily on the account of Schlenker (2005), the key binding economy principle is geared towards avoiding redundancy.

<sup>13</sup> Fox (2000) motivates the reliance on semantics using a broader notion of linguistic economy, namely, HEOC, which abbreviates the *have-an-effect-on-the-output* condition (proposed by Chomsky (1995)). Consequently, in Fox’s interpretation, the sensitivity to semantics reflects the need to make sure that grammatical operations have an effect on the upstream structure, viz. on the semantic structure or truth-conditional content.

mately a pragmatic motivation, since these principles are, *pace* Reinhart, geared towards minimising the audience's effort in interpreting linguistic utterances.<sup>14</sup> Both Scope Economy and Binding Economy are motivated by appeal to a pragmatic principle that minimises the interpretive options (i.e., the meanings corresponding to a particular utterance). Thus, in discussing quantifier scope, Reinhart (2006, p. 103) points out that “when it comes to covert movement, special attention is required to the context interface”. This is because covert movement is “a powerful mechanism that can associate with each single phonological representation several interpretations, obtained by movement not recoverable from the phonological representation itself”. She goes on to say that “[t]his is an obvious area where an interface economy requirement to minimise interpretive options would be very useful”. Clearly, this last claim means that an economy requirement would be useful from the *pragmatic* perspective of the agent who interprets the utterance (and the corresponding ‘phonological representation’). Reinhart offers the same justification for her economy principle governing binding (see *ibid.*, pp. 185-6).

The other, more concrete, pragmatic role of economy concerns the nature of the linguistic constructions that need to be explained in terms of economy and, more indirectly, the nature of the linguistic evidence needed to support the generalisations appealing to economy ideas. Thus, it seems that economy principles explain phenomena that essentially involve specific discourse (or communicational) aims. For instance, recall our previous example (5b): *If a student listens to everyone, he<sub>i</sub> must listen to him<sub>i</sub>*. Call the student Dan. I remarked that the predicate *listen to him* conveys a different meaning than *listen to himself*, and that due to this difference, the use of *him* should be preferred. The discourse aim of an utterance of (5b) would be to convey that Dan listens to Dan *in virtue of* his being part of the relevant set of people (the ones introduced in the first sentence, namely people that Dan listens to). A use of the pronoun *him* picks out Dan as previously introduced in the antecedent clause, rather than as dependent upon the referent of *he* in the second clause. This sort of ‘accidental’ reference is underlined by a specific discourse aim. The aim here is to present Dan from a different perspective, thus predicating of him what can be predicated of everyone else, and indirectly showing that the same property applies to all the members of the domain in question (people in the contextually relevant domain). This different perspective is behind the *bona fide* pragmatic intention needed for a felicitous utterance of (5b). Given this discourse aim, the economy principle allows the (theoretically) unexpected referential pattern. More generally, it is in virtue of discourse aims that the economy principles

14 Incidentally, Reinhart’s claim seems to contrast with Chomsky’s idea that the optimality of the grammar (if there is such) is an internal affaire, virtually separated from how grammar is put to use in linguistic performance and communication.



license linguistic constructions in a way that would be unexpected on previous (non-economy-based) theoretical assumptions.<sup>15</sup>

It is worth stressing that the view of pragmatics assumed here (and throughout the dissertation) has nothing in common with the so called *wastebasket* pragmatics. Pragmatics is not (or should not be) the place where all the ill-understood phenomena are pushed to, but rather a principled set of rules that guide communication. In line with such a view, pragmatics is, methodologically, on equal footing with syntax and semantics. Therefore, I shall take pragmatics to be an essential part of linguistic competence.

However, I do not aim to provide here a theory of pragmatic competence. Instead, I am interested in the pragmatic motivation of linguistic accounts. By pragmatic motivation I shall mean that the posits about the interface between syntax and semantics/pragmatics should not be pragmatically unrealistic, i.e., do violence to our pragmatic data and intuitions. In other words, we should not posit a semantic computation for which we do not have any pragmatic motivation, or a computation against which we do have *prima facie* pragmatic evidence. This desideratum comes from ensuring a smooth interface between pragmatics and other aspects of language, with minimal structural mismatches.

One crucial characteristic of pragmatic principles is their defeasibility. They are not categorical, and admit exceptions. More specifically, such principles can be overridden by other pragmatic factors. If we pay closer attention to the economy phenomena, we can note that they manifest just the required form of defeasibility. Scope economy can be trumped by prosodic factors and other pragmatic, truth-conditional effects. Binding economy can be likewise overridden for various communicative purposes.

The defeasibility of economy principles governing scope and binding brings to mind more familiar semantic/pragmatic phenomena such as scalar implicatures and some forms of presupposition.<sup>16</sup> A scalar implicature, for instance, is the inference from *Some swans are white* to *Not all swans are white*. Such inferences are very common in natural language. While scalar implicatures are very robust inferences, there are contexts where they do not hold. For instance, someone may reason as follows. *Some time ago biologists thought that swans were all white, and naturally that swans in Britain were white; therefore, biologists thought that some swans (those in Britain) were white*. It should be clear that the thought reported in the last clause, to the

15 For similar points, see Reinhart (2006, pp. 189-90, 210, 1983a) and Heim's development of Reinhart's position, especially Heim (1998, pp. 222, 236).

16 See Chierchia, Fox, and Spector (2008), Horn (2004), and Reinhart (2006) for discussion of the notion of scalar implicature, and Beaver (2001) and Beaver and Geurts (2011) for introductions to the notion of presupposition. It is worth noting that not all the accounts of scalar implicature and presupposition involve pragmatics (in a crucial way), but some do.

effect that biologists thought that *some* swans were white, does not license the inference that biologists thought that *not all* swans are white. This is a context where the usual scalar implicature *some*  $\dashv\vdash$  *not all* is somehow cancelled, or inactive.

I argue that similar cancellable inferences underlie scope and binding. First, with regard to scope, I contend that a defeasible mechanism involving scalar implicatures determines (at least in part) the availability of surface and inverse scope interpretations. Second, I maintain that binding phenomena manifest defeasible tendencies towards disjoint or identity of reference. Thus, *She thinks Anne is smart* will be read by default as asserting that some person distinct from Anne thinks of Anne as being smart, although this interpretation can be cancelled in certain contexts. For instance, one may think of the referent of the pronoun *she* under a particular guise, which does not prevent Anne from being the referent of the pronoun. (See below for more on guises.) In short, setting aside the specific details of the accounts being proposed, the most general contribution in the first two parts of the thesis is that I extrapolate from the remarks to the effect that economy principles are partly semantic/pragmatic and partly syntactic to a view that takes the economy principles to be entirely semantic/pragmatic.

### 0.2.3 Guises

I submit that noun phrases—or determiner phrases—are best seen as denoting semantic objects that are more fine grained than individuals or entities. To show this I focus in this thesis on complex demonstratives, expressions such as *this cow*, *that man in black* etc.. As I shall argue in chapter 6, complex demonstratives have more fine grained semantic values, and therefore do not refer directly but *via* a description of the object to which they are taken to refer. There are several ways to define non-referential semantic values for complex demonstratives, and the most promising view, it seems to me, is to take their semantic values to be *guises*.

It would be convenient to present a more specific theory of demonstratives, and for this task I choose the account put forward in Elbourne (2008), which is couched in situation semantics.<sup>17</sup> According to Elbourne, who builds on Nunberg (1993), the meaning of a complex demonstrative has the following structure:  $[_{DP}[[\text{that } i]R] \text{ NP}]$ . The demonstrative determiner *that* takes as an argument an individual *i*, a relation *R*, and a property (the denotation of the NP), and yields a guise or individual concept. An individual concept is a function from situations to unique individuals which satisfy (in that sit-

<sup>17</sup> For our needs, worlds would do as well as situations, though, since worlds are bigger situations ordered according to a *part-of* relation, and the *part-of* relation will not be relevant for most of our uses of the notion of guise.



uation) the property denoted by the NP and is in the relation  $R$  to the individual  $i$  given contextually.<sup>18</sup> As Elbourne (2008, pp. 430-1) points out, a standard value for the composition of  $i$  and  $R$  is the property of being identical to a particular person or thing (most of the time  $i$  itself, but not necessarily so). For instance, if I point to Will and say *That man in black is funny*, the individual concept (which is the semantic value of the complex demonstrative) will be akin to the description *the distal person that is identical (=  $R$ ) to Will (=  $i$ ) and is a man in black (= the NP-property)*. In this case, we can say that Will is the referent (or content) of the demonstrative, as long as we do not forget that the value of the demonstrative is in fact more fine grained.<sup>19</sup>

Note also that this account can distinguish between *de dicto* and *de re* uses of demonstratives. It all depends on how we identify the property derived from  $i$  and  $R$ , in particular on whether we derive something like the property of being a person that bears  $R$  (e.g. is identical) to  $i$  at the *actual* world (time or situation), or the property of being a person that bears  $R$  to  $i$  at some *possible* world, namely, the world of evaluation (whatever that happens to be). The former interpretation freezes the referent of the demonstratives, which will then be the same in any imaginable situation. Thus, we could consistently assert *That man in black could not wear black*, as long as we understand the complex demonstrative *that man in black* in a *de re* manner. On the *de re* reading, the sentence says that the man who wears black at a certain world  $w_0$  (identified as the actual world of utterance) is a man who does not wear black at a different world  $w_1$ , which is possible relative to (or ‘accessible’ from) the actual world. In contrast, on the *de dicto* reading, the sentence asserts that there is a possible world (accessible from the actual one) in which the man in black fails to wear black. Remote figurative interpretations aside, the *de dicto* interpretation is contradictory.

Several features of guises will become important in the coming chapters dealing with binding phenomena (chapters 4 and 6). Guise-valued meanings can be attributed to other expressions, such as pronouns and definite descriptions (see Elbourne 2005, 2008, 2013 for details). For our purposes, the most important feature of guises is that they can incorporate descriptive conditions *via* the linguistic or extra-linguistic context. Thus, *he* can denote a guise akin to the denotation of *the person that satisfies such and such a condition*, where the condition in question is given contextually, and it is presupposed that the person referred to is a male.

18 As I suggested earlier, it is important that the principles I am proposing are pragmatically motivated, and thus have an intuitive communicative purpose. In the case of complex demonstratives, the relation  $R$  should be salient in the context.

19 The fine grained value of the complex demonstrative is, on the current account, a guise, viz. a semantic value of type  $\langle s, e \rangle$ , rather than an entity, viz. a semantic value of type  $\langle e \rangle$ .

Another crucial feature of guises is that they can be generalised from individual types to other types. We can thus think of guises of properties—what I shall call, more generally, *complex guises*—functions from situations to properties. Thus, the property of loving John and the property of loving oneself may well be properties of the same individual at a world, but not at another. This complex guise can nevertheless be expressed by the same verb phrase, e.g. *loves himself*. There are other kinds of guises. We may further think of *special* individual guises, mixtures of individual guises that merge and make up other individual guises. Suppose I assume that two individuals are identical. To take a famous example, say I make the assumption that Lakoff (a person known to us) is Jesus, and then immediately evaluate the statement *he forgives his friends' sins* under that identity assumption. In this context, the pronouns *he* and *his* may refer back to a *Lakoff-Jesus* mixture, a guise that preserves both characteristics of Lakoff and Jesus. As we shall see, certain apparent violations of binding theory can be solved by introducing these sorts of guises, and re-defining the relevant binding principles in terms of them.

#### 0.2.4 Logicality

Logicality is a property that follows from the structural properties presupposed by economy principles. The structural properties on which the economy computation is based are logical properties. As such, economy phenomena are part of a larger set of linguistic phenomena that appear to manifest logicality, and for which an explanation in terms of logical properties seems to be particularly suited.

Let us see how logicality can enter the explanation of several contrasts, starting with *but*-exceptives. Notice the contrast in the acceptability of the two sentences in (6).

##### 6. *But*-Exceptives (von Fintel 1994)

- a) No one but John smokes.
- b) \*Someone but John smokes.

Von Fintel's (1994) interpretation of exceptives has it that an exceptive statement asserts that (i) the relevant predicate (e.g. *smokes*) is *true* of a set of individuals from which we subtract the exception *e*, that is, the set  $D - e$  (in our case, *e* is John). Moreover, it should be the case that (ii) if we are *not* subtracting the exception, the sentence predicating the relevant predicate of the domain of individuals *D* (where  $e \in D$ ) is *false*. Then, on this account, the acceptability of exceptive phrases depends on the compatibility of these two conditions. Let us take a look at our examples and check whether the two conditions are consistent.

In the case of (6a), both conditions seem to be satisfied, because it is possible that (i) *smokes* is true of no one except John (that is,  $\forall x \in$

$D - e : x$  is a non-smoker), and (ii) if we leave John in the relevant domain, the sentence *no one smokes* (that is,  $\forall x \in D : x$  is a non-smoker) falls short of being true. So the two conditions are consistent in the case of (6a). In contrast, the situation is different with (6b). Let us assume that condition (i) is observed. Thus, in compliance with (i), if we subtract John from the set of smokers (a vacuous operation), the set of smokers remains non-empty (that is,  $\exists x \in D : x \neq e \ \& \ x$  is a smoker). However, condition (ii) cannot be fulfilled, because the requirement amounts to saying that by not removing the exception the resulting sentence (namely,  $\exists x \in D : x$  is a smoker) would be false, that is, it would be false that someone smokes. That would mean that there is no person who smokes. But this cannot be the case for in (i) we assumed that there *is* a smoker in  $D$ . By making the second assumption corresponding to the condition (ii) of the semantics of exceptives, we derive a contradiction. Consequently, the explanation goes, because of the contradiction, (6b) is ungrammatical.

Chierchia (2013), building on several previous proposals, offers a similar explanation for polarity sensitive items (PSIs). In his view, PSIs (e.g. *any*) involve a domain of quantification at least as large as the other quantificational items such as *some*, *a(n)*, and bare plurals.

#### 7. Polarity Sensitive Items (*ibid.*, 39ff)

- a) There are (some) cookies left.
- b) \*There are any cookies left.

The core of the explanation involves an alternative-based semantics alongside an exhaustive operator  $O$  akin to *only*. In particular, Chierchia assumes that the assertion in (7b) implies that there is a set of alternatives to the implicit restriction of the PSI *any*, and that those alternatives which are not entailed by the implicit restriction of the PSI should be removed by exhaustification *via*  $O$ . At the same time, he posits that the focal alternatives of a PSI are *subsets* of the domain associated with the PSI in question.<sup>20</sup>

These assumptions about the semantics of PSIs entail a contradiction in certain cases such as the one in (7b). Importantly, such contexts are not downward entailing, i.e., they do not license subset inferences, e.g. inferences from *Every student at UEA is talented* to *Every female student at UEA is talented*.<sup>21</sup> The contradiction is due to the fact that (i) the assertion of (7b) entails that there are cookies left in the relevant domain. But, (ii) the focal alternatives of the PSI *any* are cookies in subdomains of the domain associated with that PSI, and these alternatives are not entailed by the previous assertion. This is basically because *There are cookies left in the kitchen* does not entail that *There*

<sup>20</sup> As Chierchia (2013) points out, this is the only stipulation needed to explain a range of phenomena involving polarity sensitive items.

<sup>21</sup> The downward and upward entailing contexts will be further discussed in chapter 1; see appendix A for definitions.

*are cookies left in the oven* (where, naturally, the things in the oven are a subset of the things in the kitchen). As I have just observed, such subset-inferences are not warranted. Once again, none of the (subset) alternatives of the polarity item is entailed by the assertion, and hence all the alternatives are removed by exhaustification *via* O. This means that the negation of each alternative is implied. That is, according to (ii), the cookies are not in the oven, in the cupboard, on the kitchen table, or any other place in the kitchen. However, on the previous assumption, (i), the cookies are nevertheless in the kitchen. But the cookies cannot be in the kitchen if they are nowhere to be found! In other words, the assertion (i) together with the latter claim (ii) are contradictory. Chierchia maintains that the logical property of contradictoriness plays an essential role in the deviance of (7b). (He points out that this is a species of contradiction, which he calls *G-contradiction*; see §2.3 and [conclusions](#) for discussion.)

I have reviewed two instances where logicity plays an important role in linguistic explanation, and therefore seems to support the view that grammar is sensitive to logical properties. It is easy to see that the principles of economy governing binding and scope phenomena have a similar logical flavour. According to the truth-conditional principles of economy, a logical form (LF) is licensed only if it enters in the appropriate logical relation with another alternative LF. In particular, the LF should be logically distinct from, i.e., not logically equivalent with, its alternative. Going back to our previous example (5a), *A student listens to every teacher*, note that in order to be able to establish that the inverse scope of this construction is distinct from the surface scope, we have to establish that the logical equivalence  $LF_S \equiv LF_I$  does not hold. (The surface and inverse scope readings are those that entail, respectively, that there is a unique student who listens to every teacher and that there may be several students who jointly listen to all the teachers.) Crucially, it is part and parcel of the economy principle that the non-functional (non-logical) lexical items in (5a) have no role in establishing whether the surface form is distinct from the inverse scope form. Only the relative position of the quantifiers in their respective logical forms matters. On reflection, the same remarks hold true of the binding case in (5b). As I shall demonstrate in chapter 5, there are several logical implementations of the binding economy principles, and there are ways to show that the logicity presupposed by these principles is genuine, and theoretically desirable.

Therefore, it seems that economy principles resemble numerous other linguistic accounts in making substantial use of logical properties, and offer further support for the thesis that language is logical.<sup>22</sup> The main difference between the logicity involved in the economy

22 Some further examples of logicity-based explanations of linguistic explanations are given in Chierchia (2013), Gajewski (2002), and Kratzer (2012), and, more relevant to our concerns (pertaining to economy-phenomena) in Fox (2000) and Reinhart (2006).

cases, on the one hand, and the case of *but*-exceptives and polarity sensitive items, on the other hand, is that whilst in the latter case contradictions play an explanatory role, in the former case, it is the notion of logical entailment that plays the explanatory role. More precisely, in the standard economy cases, it is essential for the grammaticality of the relevant (inverse scope or coreference) readings that mutual entailment between them and their competitors does *not* hold. However, other hypotheses based on grammar's sensitivity to logic are possible within the linguistic economy framework, broadly speaking. In particular, as I shall argue in chapter 2, a more pragmatic alternative to the standard linguistic economy accounts of scope makes use of contradictions in order to characterise scopal saliency.

Two final remarks are in order. First, I have pointed out earlier that principles of economy are local and defeasible, and I implied that these are legitimate characteristics of linguistic principles. I would now like to qualify this implication. It is worth keeping in mind that both locality and defeasibility features admit degrees.

By drawing on several specific cases, I argue that principles that are local and defeasible to a *high* degree cause a number of methodological issues. Indeed, I show that extreme forms of locality and defeasibility clash with methodological principles of generality and non-*ad hocness*. For such extreme cases shrink the domain of applicability of linguistic principles to such an extent that it becomes impossible to say whether the principles are really there in the 'linguistic world' or not. As such, they become virtually impossible to disconfirm. Furthermore, if we make these principles so local and defeasible as to confine their domain to a singular phenomenon (or type of data), then a contrary theoretical reaction becomes more appealing. More precisely, it becomes more appealing to seek for more general principles that recover the very same singular phenomenon as a particular case. So there is an increasing cost associated with making use of a principle or explanatory strategy whose empirical content gets more and more narrow over time. Theorists have to strike the right balance.

The second remark concerns an exegetical matter, with potentially important implications. I have stated that I shall press two methodological points (or desiderata)—namely, generality and pragmatism—against several linguistic economy accounts, and I also suggested that these points were among the rationales for linguistic economy. I now want to make it clear that these two desiderata didn't come packaged together originally, and were proposed by different theorists. (I cited Chomsky 1995 as a representative of the generality desideratum and Reinhart 2006 for the pragmatic desideratum.) One may object that these desiderata are not even compatible. So I would like to state it explicitly—though the issue may prove to be controversial—that, in my view, the two desiderata are both necessary, since they guard us from making the wrong theoretical investments, so to speak. In par-

ticular, they guard us from making the dubious explanatory moves pointed out in the previous remark, since, as I shall propose, pragmatism is an antidote to *ad hocness*, and generality of empirical claims is desirable in itself (as long as the goal of generality is attainable and offers any insight at all). In addition, I also claim that the two desiderata are not unrealistic, since if we pick our linguistic economy accounts well, we can meet both desiderata.

### 0.3 OUTLOOK

To sum up, economy principles and phenomena give rise to important linguistic problems pertaining either to the interface between syntax and semantics, or, as I shall argue, to the interface between semantics and pragmatics. In this thesis, I approach these problems from a philosophical linguistic point of view, aiming at a high-level description of the relevant phenomena. I propose a set of hypotheses that develop several basic linguistic economy assumptions, and shift away from others. From an architectural point of view, my claim is that the economy principles are best conceived as belonging at the semantics/pragmatics interface. I also draw several important implications of economy principles for the semantics of definite noun phrases, and, in particular, for the semantics of complex demonstratives. Further, I argue that the structural properties of economy phenomena are genuinely logical. Economy principles are structural conditions that interact with a great variety of linguistic phenomena. Moreover, in putting forward these claims, I shall address several independently interesting linguistic topics such as identity statements, *de se* pronouns, comparative constructions, modals, definites, and quantifiers. These will stand proof for the wide range of implications of economy-based explanatory strategies.

The thesis is divided in three parts (each consisting of two chapters) dealing with scope economy principles, binding economy principles, and their consequences, respectively. Each chapter looks at linguistic economy from a different perspective, alternating positive and negative proposals. The first two chapters address the topic of scope. In chapter 1, I present a *scope* economy principle (what I shall call *strong economy*) and show that it has to answer a number of fundamental challenges. In chapter 2, I develop an account of scope that meets part of these challenges. The following two chapters, which are concerned with binding, repeat a similar pattern: in chapter 3 I discuss the shortcomings of *binding* economy proposals, and in chapter 4 I develop an account that remedies some of these shortcomings. In the third part of the thesis, I draw important *consequences* for the hypothesis that grammar is sensitive to logical properties, and for the semantics of definites. Accordingly, chapter 5 addresses logicity,

and chapter 6 complex demonstratives (and other definites). In [conclusions](#), I outline the general view of scope and binding phenomena that follows from the set of hypotheses put forward in the thesis.

## Part I

### ECONOMY-BASED ACCOUNTS OF SCOPE



# 1

## STRONG SCOPE ECONOMY PROBLEMS

In the first part of the thesis I shall outline two competing views of scope which rely on economy considerations. The two views give a central role to semantic entailment, but otherwise differ in both their detailed theoretical underpinnings and more general architectural consequences. I seek to establish the merits and limitations of the economy-based views of scope, and demonstrate the advantages of one of them—the *controversy-based view*. In chapter 1, I focus on the *strong economy* view, examining its explanatory potential, but also its shortcomings. The controversy-based view is then developed in the second chapter in order to show that it meets the desiderata on account of which the strong economy view falls short.

### 1.1 INTRODUCTION: SCOPE AND ECONOMY

Ambiguity is pretty common in natural language but not universal. For instance, the sentence *Everyone loves some movie* has interpretations that are missing from similar subject-verb-object constructions such as *Everyone loves Titanic*. Translating the two constructions in first (or a higher) order logic yields two semantically distinct interpretations for the former, and only one interpretation for the latter. The natural language operators resemble well enough their logical counterparts, and therefore we can take scope to be a property of linguistic constructions.

It is not the task of this thesis to argue directly that scope is a real linguistic property; scope is certainly a central notion in linguistic theory, and I shall investigate one important semantic aspect of this notion. Scope is one of the sources of structural ambiguity in natural language, and is thus a source of semantic flexibility. Hence, out of the two sentences above, only the former is said to be scopally ambiguous, because it allows for a flexible interpretation. For instance, someone asserting that everyone loves some movie may say that there is a unique movie that everyone loves. This reading corresponds to the only reading allowed by the second sentence (to the effect that everyone loves Titanic). But the former sentence can be used to say something that has no correspondent in the interpretation of the latter sentence, namely, it can say that everyone loves a different movie.

I am interested in how linguistic economy affects scope, and for this purpose I shall assume a somewhat restricted interpretation of economy. On this view, an economical language would allow flexibility at the level of form just in case such flexibility determines effects on meaning (to accompany the effects on form). I shall study scope as a way to understand the potential economy of language. The scopal phenomena—along binding, which is discussed in chapters 3 and 4—have been the basis of some of the most convincing arguments for linguistic economy. So if scopal flexibility is wide-spread in natural language, can the same be said about linguistic economy in scopal phenomena? How pervasive is linguistic economy in scopal phenomena? To anticipate, my answer in this chapter will be that if we define linguistic economy in a certain way, the economy of scope appears to be very much restricted. Indeed, the economy of scope (on the ‘interface’ conception) will appear to be so restricted as to make us wonder if the notion of economy can be applied at all to regulate scopal flexibility in natural language.

However, even if I resist the notion of interface economy, I find the idea of economy itself worth pursuing, especially in conjunction with recent empirical hypotheses. In the recent literature, there has been a growing interest in the notion of semantic strength and the related notion of entailment, especially in connection to scalar implicatures (see e.g. Chierchia 2004; Horn 2001, 2004; Levinson 2000; Sauerland 2004). At the same time, various notions of semantic strength have also been invoked by a number of theorists as key to understanding scopal relations, and, more precisely, as an alternative to conceiving scope as being bound strictly to the special properties of the various scope-taking operators (Fox 2000; Mayr and Spector 2010; Reinhart 2006).

In other words, these theorists proposed to look for a structural account of scope rather than a (construction-based) account of scope which depends on idiosyncratic properties of each scope-taking operator. The latter (construction-based) approach would require a separate account for each functional item such as *not*, *few*, *every*, *some*, etc.. While such functional items do have some distinctive scopal properties, these functional terms also share some properties. It is in virtue of these properties that more general, structural accounts of scope are possible.<sup>1</sup> In this chapter and the next, I shall bring together the two theoretical strands just introduced, and discuss linguistic economy accounts that relate more intimately the notions of scope and semantic strength.

<sup>1</sup> See e.g. Fox (2000), Mayr and Spector (2010), and Reinhart (1983a, 2006) for structural accounts of scope.

## Scope and economy

Our first step in developing a strength-based (semantic) account of scope is to analyse what I call the *strong economy principle*, and its proponents, Mayr and Spector (2010), call the *Generalised Scope Economy Condition* (GSEC). A way to think about the strong economy principle governing scope is that GSEC seeks to justify bringing into the grammar principles that were traditionally considered part of pragmatics.<sup>2</sup> Grice (1967/1989), in his pragmatic account, proposed a maxim of conversation that dealt with the informativeness of an utterance along the lines of the dictum: “do not say more than is required”. GSEC can be viewed as building that principle into the grammar—more specifically, at the interface between syntax and semantics—by preventing the application of covert operations when they result in strengthening the meaning of a sentence. The strong economy principle is in effect a stronger restriction on the generative mechanism than its predecessor, Scope Economy (SE), since it can disallow more scopal structures than SE (see Fox 2000).<sup>3</sup> In what follows, I present the strong economy principle and its advantages (§1.1), and raise some empirical and conceptual difficulties facing this principle (§1.2). I conclude by proposing a better generalisation that can account for why stronger scopes may sometimes be disallowed. The appendices discuss the notion of monotonicity needed to evaluate the principle of strong economy (appendix A) and further counterexamples to strong economy (appendix B).

The more immediate aims are first, to demonstrate that there are important obstacles and limitations to a strength-based principle of economy and, second, to establish a baseline, deflationary account of the data that seem favourable to the strong economy principle. One moral of the chapter is that it is difficult to achieve a general account of scope. The breath of data discussed here is meant to highlight the difficulty of understanding scope as a unitary phenomenon, on the basis of a general structural (e.g. entailment-based) constraints on scopal readings. Against this background, I shall advance in the next chapter a hypothesis that articulates a more general and, at the same time, plausible descriptive constraint on scope.

In evaluating linguistic economy accounts, I endorse several desiderata that were originally proposed as rationales for economy principles (see the introduction), but have also some independent legiti-

<sup>2</sup> See Chierchia, Fox, and Spector (2008) for a similar *grammatical* view on scalar implicatures, one that moreover assumes that the computation is local; locality is not part of GSEC assumptions, but grammaticality is.

<sup>3</sup> GSEC constitutes in a sense a simplification relative to the economy principle, the basic insights of which it inherits. Whilst the scope economy principle (SE) involved checking for any two forms  $LF_i$  and  $LF_s$  related by movement or other covert operation whether  $LF_i \leftrightarrow LF_s$ , GSEC involves only checking whether  $LF_i \rightarrow LF_s$ . If the latter condition holds, no matter what the status of  $LF_s \rightarrow LF_i$  is, the  $LF_i$  is disallowed, thence ungrammatical. Computationally, this is not a significant difference.

macy. Such linguistic accounts should be based on general principles, and avoid making assumptions that confine their empirical content to a narrow type of linguistic constructions. Relatedly, they should be simple in the sense of shunning unnecessary assumptions and *ad hocery*. Finally, the economy-based accounts should rely on semantic assumptions that have a plausible pragmatic rationale. To be sure, since these criteria are matters of degree, arguments based on them cannot do more than assess the varying costs that certain accounts incur.

#### Strong economy

Mayr and Spector (2010, p. 1) advance a principle of economy that they call *Generalised Scope Economy Condition* (GSEC). The GSEC can be stated as follows:

**GSEC** A covert scope shifting operation is blocked if the resulting reading is equivalent to *or stronger than* (i.e., asymmetrically entails) the reading obtained without its application.

GSEC is a *strong* economy principle, and henceforth I shall sometimes refer to it as ‘strong economy’. As the name of the principle suggests, this is a generalisation of another principle of economy, Scope Economy (SE) advanced by Fox (2000). (SE required that truth-conditionally inert sentences, i.e., sentences whose scopal readings are equivalent, should have unique, ‘surface scope’, logical forms.) The generalisation underlying strong economy consists in the addition of the disjunct *emphasised* in the statement of GSEC above. Accordingly, not only does this principle rule out uninformative scopes (as SE did before), but also strong scopes. The strength of a scopal reading is given in terms of entailment, under the standard interpretation of this notion. A form A entails another form B if and only if it cannot be the case that A is true and B is false. Equivalently, a form A entails another form B just in case the truth of B automatically follows the truth of A.<sup>4</sup>

To support the GSEC, Mayr and Spector (2010, pp. 2–4) present the examples below (the judgments on the right-hand side are theirs as well). As for most of the examples in the present chapter, I use the following annotations and notational conventions: the possible (or relevant) scopal readings of the examples, as well as their degree of acceptability, are represented on the right-hand side of the examples.<sup>5</sup>

4 The particular form of entailment that we shall end up with naturally depends on how we carve out the logical space in the (semantic) metalanguage, i.e., on what we take to be the possibilities we are describing and the set-theoretical relations between them.

5 As usual, \*, ??, ? represent degrees of acceptability from the less acceptable (or more deviant) to the more acceptable (or less deviant). Where no such sign is present, the

8. a) Every student of mine didn't show up on time.  
( $\neg > \forall$ ), ( $\forall > \neg$ )  
b) John didn't meet every student of mine on time.  
( $\neg > \forall$ ),  $*(\forall > \neg)$
9. A/one student of mine didn't show up on time.  
??( $\neg > \exists$ ), ( $\exists > \neg$ )
10. a) Many windows are always open in this building.  
(many  $> \forall$ ), ( $\forall > \text{many}$ )  
b) Few windows are always open in this building.  
(few  $> \forall$ ),  $*(\forall > \text{few})$
11. a) More than three students are certain to pass.  
(more  $> \forall$ ), ( $\forall > \text{more}$ )  
b) Fewer than three students are certain to pass.  
(fewer  $> \forall$ ),  $*(\forall > \text{fewer})$
12. a) A boy heard every girl sing. ( $\exists > \forall$ ), ( $\forall > \exists$ )  
b) Few boys heard every girl sing. (few  $> \forall$ ),  $*(\forall > \text{few})$

As the right-hand side representations suggest, some of the above examples are to be interpreted as having an important restriction on their scopal flexibility. Meanwhile, the other examples are not so restricted. For instance, on the GSEC view, in the first sentence in (8), the negation can freely cross the universal quantifier *every student*, since in doing so the resulting (inverse scope) form will not be stronger, but weaker than the surface scope interpretation. That this is so should be clear from inspecting the intuitive truth conditions of the sentence. Under the surface scope reading ( $\forall > \neg$ ), the sentence (8a) says that *no* student of mine showed up on time. Under the inverse scope reading ( $\neg > \forall$ ), the same sentence says that *not all* students showed up on time. The surface scope reading entails the inverse scope reading, since if no student showed up it automatically follows that not all students showed up—the latter is weaker than the former, or, alternatively, the former is stronger than the latter. Since GSEC requires that only the stronger inverse scopal readings be disallowed, but allows weaker inverse scopal readings, the inverse scope of (8a) (which is, as we have seen, the weaker scopal reading) is predicted to be acceptable. This seems indeed to be the case. In contrast, on the assumptions of the strong economy theorists, in the second sentence in (8), the negation can no longer cross the universal to produce the inverse scope reading—hence, the  $*(\forall > \neg)$  judgement—since such an inverse scope reading is stronger. (The inverse scope reading of (8b)

---

corresponding reading is perfectly acceptable. The quantifier-symbol  $\forall$  represents the quantificational phrases *all*, *every*, and *each*, but also quantificational adverbs and adjectives such as *always* and *certain*.

amounts to saying that John didn't meet any student of mine, which is clearly stronger than saying that John didn't meet every student.) Therefore, the inverse scope reading is disallowed by GSEC, and, on the strong-economy account, an unacceptability judgement ensues.

To take another example, consider (12) where the first sentence is (intuitively) scopally ambiguous, whilst the second is not. On the GSEC view, this is because the inverse scope interpretation of the first sentence is not stronger than its surface scope. If a unique boy, say, John, heard every girl (surface scope reading), it automatically follows that every girl was heard by a boy (inverse scope reading). That is, the surface scope reading of the first sentence is stronger than its inverse scope reading, and the inverse scope reading is indeed available (as strong economy requires). In contrast, the inverse scope reading of the second sentence in (12) is stronger, and GSEC must rule it out. So, if every girl was heard by few boys, say, by three boys (inverse scope), *a fortiori* there are few boys—in particular, less than three, if any—that heard all the girls (surface scope). But the converse does not hold. If few boys heard every girl, this does not imply that each girl was heard by few boys; she may be heard by many or almost all the boys. (These boys—be they many or almost all of the boys in the relevant domain—are not the same for every girl.) Therefore, inverse scope is disallowed by GSEC, because it is too strong.

The moral to be drawn from examining these constructions is that downward entailing operators (e.g. negation, *few*, *fewer than*, *less than*) cannot take inverse scope *under* universal quantifiers, but can freely take inverse scope *over* universal quantifiers. (See appendix A for an explication of downward entailing environments.) GSEC makes these predictions because narrow scopings of downward entailing operators produce semantically stronger logical forms, that is, logical forms that asymmetrically entail the constructions from which they are obtained by the application of a covert operation—quantifier raising (QR), quantifier lowering (QL), or reconstruction.<sup>6</sup>

I shall provisionally assume that these judgements of acceptability are on the right track. However, the fact that these judgements are nuanced should bear emphasis. To begin with, the starred (\*) scopal interpretations are marginally acceptable, at least under readings with marked intonation; cases in point are (8b), (9), (10b), (11b), and

6 There are further examples in the literature that seem to point us in the same direction, thus supporting the strong economy generalisation. Miyagawa (2011) (following K. Johnson 2000) notes that negation blocks reconstruction of indefinites. For instance, according to the judgements of these theorists, *Some student or other hasn't answered many of the questions on the exam* cannot be interpreted with negation scoping over the indefinite phrase *some student or other*. The findings of Beghelli and Stowell (1997) mostly corroborate GSEC. They remark that (i) QPs can take scope above negation, unless they are indefinites or bare numerals (e.g. *The students didn't read some books*), and (ii) QPs always take scope above negation in the absence of marked intonation (e.g. *Some students didn't read this book*).

(12b). Moreover, the corresponding inverse scope readings of the constructions with upward entailing operators are also marginal, or at least less salient than the surface readings. See e.g. (8a), (10a). These observations will become important in the following discussion, and especially in the next chapter.

## 1.2 MOTIVATION FOR AN ALTERNATIVE

In this section I raise several important challenges for the strong economy principle. I begin by discussing an assumption about certain downward entailing determiners implicitly assumed in order to argue for GSEC. I show that the assumption is problematic. I then turn to several more straightforward empirical problems facing the strong economy hypothesis. These problems will provide motivation for an alternative account.

### 1.2.1 Non-emptiness implications

Let me introduce a potentially problematic phenomenon that arises from the downward monotonicity property together with further reasonable assumptions about quantifiers.

#### 1.2.1.1 *My objections*

Here is the problem, in brief. In order to argue that *few* takes scope over a universal quantifier, as in (10)-(12), we need to assume that empty sets count as having few elements, or, equivalently, that 0 (zero) counts as *few*. But many quantifiers, including, arguably, the *few*-quantificational phrases, come with a non-emptiness—or, roughly speaking, an existence—assumption.<sup>7</sup> To take a simple example, imagine that in talking about a blank page I say that few black spots are on the page. My utterance would be clearly out of place on this occasion, as I could have easily been more precise. This infelicity suggests that *few* implies—implicates or presupposes—existence. Let us assume, to a first approximation, that this implication is a presupposition in the sense that a sentence cannot have a truth-value unless its presupposition is true. If this presupposition is at work, we have no warrant that under inverse scope certain downward entailing quantifiers, such as *few*-quantifiers, will denote anything at all. The inverse scope readings will lead to presupposition failure (since there is no basis, in general, for assuming non-emptiness of the relevant domain), and the GSEC mechanism would not predict the desired result, contrary to the claim made in the analysis of the examples in (8)-(12) to the

<sup>7</sup> Hackl (2000, p. 157) also acknowledges (in passing) the existence implication of *fewer than* determiners.



effect that downward entailing operators can freely take scope over universal quantifiers. This problem, albeit not insurmountable, will motivate a more elegant and simple alternative framework for thinking about scope. At the same time, this problem raises important issues about the potential interaction of the strong principle of economy with other grammatical principles.

In this discussion, I shall often talk about domains—the domains of quantifying determiners. By domain here I mean the restrictor of the determiner, or, more precisely, the intersection of the set expressed by the restrictor and the set expressed by the nuclear scope (e.g. predicate in the the object position).<sup>8</sup> I understand the domain in this more restrictive sense rather than the broad sense in which it covers the whole domain of discourse. For instance, in the sentence *Most students left the campus*, the domain of the quantifying determiner *most* is the intersection of the set denoted by its restrictor *students*, viz. the set of students (or perhaps the set of students at UEA, if we allow for covert restrictors) and the set denoted by its nuclear scope *left the campus*, viz. the set of people that left the campus. The intersection forms the set of students who left the campus. And this set is the domain in our sense, rather than the whole universe of discourse, say the set of people. The entire sentence will then say that a big proportion of the students (say, more than half of them) are students who left the campus.

As suggested, one of the main empirical arguments in favour of GSEC proceeds from constructions containing downward entailing operators (e.g. *few*) in object position. For instance, if every boy saw few girls (say 3), then, the argument runs, *a fortiori* there are few girls ( $\leq 3$ ) that every single boy saw. This means that when a downward entailing operator, e.g. the quantifier phrase *few girls*, initially in object position at surface structure, takes wide scope at LF, the ensuing proposition is weaker, since it is entailed by the surface scope. But this reasoning entails that the domain of *few* can be empty.

Indeed, I take Mayr and Spector (2010, p. 4) to be implicitly relying on the emptiness assumption. Consider one of their examples, namely the scopal construction of *It's always the case that few windows are open*, with the universal quantifier taking precedence over the *few*-quantifier at surface scope. Mayr and Spector's thought is that if for each moment of time there is a low number  $k$  of windows open at that time, then the number  $k'$  of windows permanently open (i.e., the number  $k'$  such that it is true that the same set of  $k'$  windows are open at each single point in time) is going to be even lower than  $k$  (i.e.,  $k' \leq k$ ). This takes for granted that it is realistic to set the numeric values  $k = 3$  and  $k' = 0$  in order to interpret the two scopal readings. (After all, these numerical values satisfy the condition  $k' \leq k$ .)

<sup>8</sup> In fact, for our purposes it will do as well to take the domain to be the restrictor of the determiner.



Of course, when  $k'$  is 0 the domain of *few* is empty. Let us call the assumption that empty domains are generally allowed *emptiness* and the assumption that they are not generally allowed *non-emptiness*.

I pointed out that the emptiness assumption is at odds with the intuitive judgements about *few* and similar downward entailing operators. An example that illustrates the presupposition failure problem due to the non-emptiness assumption is the following.<sup>9</sup>

13. Every class will send few pupils to the olympiad.
  - a) Each class will send few pupils to the olympiad. ( $\forall > \text{few}$ )
  - b) Few pupils in each class will be sent to the olympiad.  
( $\text{few} > \forall$ )

Now, the surface scope is as in (13a). The inverse scope is then as in (13b). But is the inverse scope accessible? What is certain is that GSEC needs the inverse scope to be accessible on pain of failing to compute the entailment relation, which (on the assumption of the strong economists) will ultimately allow the inverse scope of (13). However, reasonable assumptions about the set of pupils and the classes in question make the existence of a set of pupils *that belong to every class* doubtful. The existence of the relevant non-empty set of pupils is not warranted, and therefore the inverse scope reading is pragmatically implausible. It is this very reading that the strong economy predicts to be available all the while. It is worth stressing that we have focused here on distributive readings, and disregarded the collective readings, which are indeed more plausible. Nevertheless, it is sufficient for our purposes to show that, albeit they are *bona fide* scopal structures, the distributive readings do not comply with strong economy.<sup>10</sup>

For comparative purposes, consider how upward entailing operators, e.g. *some*, *a* etc., fare in inverse scope readings. In sentences such as *In every class there is a math geek* ( $\forall > \exists$ ), it is clear that the inverse scope is not entailed by the surface scope interpretation.<sup>11</sup> In contrast, the situation is different with doubly quantified sentences of the form ( $\exists > \forall$ ), such as *Some student attended every meeting*. Although this case involves the upward entailing operator *some* (rather

<sup>9</sup> I focus here on the so called *distributive* readings of the quantifiers, rather than on their collective readings. The distributive reading of e.g. *three students from every class* should be interpreted as ‘distributing’ three students to each of the classes. This means that the three students should belong to each single class (they belong to class 1, class 2, and class 3), rather than to one of the classes (e.g. student 1 belongs to class 1, student 2 belongs to class 2 etc.) and collectively to all of the three classes.

<sup>10</sup> In fact, we shall also show that the collective readings of downward entailing operators do not generally comply with strong economy either—see the analysis of (34) and (35) below.

<sup>11</sup> This so because quite generally under the distributive readings of quantifiers, the  $\exists\forall$  scopal reading is strictly stronger than  $\forall\exists$ .

than the downward entailing operator *few*), it is analogous to the doubly quantified sentences of the form  $(\forall > \text{few})$ , since, on the strong economy view, both are supposed to entail their inverse scope. But whilst in the  $(\exists > \forall)$  case, the non-emptiness condition is necessarily preserved (entailed) in passing from surface scope to inverse scope, this is not the case with the  $(\forall > \text{few})$  constructions. As I have pointed out in discussing (13), this existence-preserving entailment does *not* generally hold for the case of *few* in object position.

To clarify, I am not objecting to the availability of inverse scope downward entailing operators in general, but only to the claim that the inverse scope is *entailed* by the surface scope. Inverse scope may well be available. The question I am asking—and contend it is to be answered in the negative—is whether the availability of inverse scope is regulated by strong economy, and, more specifically, by asymmetric entailment. If the above entailment does not hold, strong economy fails to predict the availability of the inverse scope reading, contrary to the strong economists’ contention.

One line of response to the above predicament is to claim that quantifiers (including *few*-quantifiers) can have empty domains, which makes the inverse scope reading of (13) acceptable. But if we were to make the assumption that empty domains are available, we get further predicaments from considering examples with universals quantifiers.

14. a) Every pupil has few pencils.  $(\forall > \text{few})$   
       b) Few tunes can be heard in every room.  $(\text{few} > \forall)$

Suppose that, in (14a), we let the restrictor (or its intersection with the nuclear scope) of *every* be empty. Note that on assumptions in line with strong economy, we need to accommodate an empty domain only at a level where the ‘economy’ properties of logical forms are computed, that is, a level that precedes the semantic/pragmatic level. If we let the domain be empty, it then follows, by reasonable logical assumptions, that the statement (14a) is trivially true. After all, there is no situation that can falsify the statement. No pupil is such that it has less (or more) than few pencils. (In fact, it doesn’t really matter what quantifier is in object position; “some pencils” or “three pencils” would equally do, as long as we assume that the subject position quantifiers admit empty domains.)

Moreover, under the same assumption—that we somehow accommodate empty domains—a similar reasoning will make the inverse scope of (14b) trivially true. If there are no rooms (i.e., objects in the domain) to falsify (14b), rooms in which more (or less) than few tunes are played, then the inverse scope would always come out true. These are the unwelcome consequences of admitting empty domains.

Not only are these consequences unintuitive with regard to the readings of the above constructions, but they threaten any account

based on semantic strength, including the GSEC one. On the strong economy view, for instance, since the surface scope of constructions with universals in subject position admits of a trivially true reading, the inverse scope readings generated by these constructions will be trivially true as well and GSEC should allow them contrary to the very predictions of the strong economy theorists presented in (8b), (10b), (11b), and (12b). Clearly, there should be a constraint on which quantifiers are allowed to have empty-domain readings. Hence, an urgent question for the strong economy theorists is why should the determiner *few* be singled out in this way, and, more specifically, why is it the only one which admits empty domains (putting aside *no*, for the moment).

In fairness to Mayr and Spector (2010), they do postulate (p.4) that the restrictors of universal quantifiers should be non-empty. However, they implicitly assume that *few*-quantifiers can have empty domains. But, in neutral contexts, both universal and *few*-quantifiers seem to presuppose non-emptiness, so there doesn't seem to be any basis for discriminating between the two types of quantifiers. Moreover, if the strong economy advocates stipulate non-emptiness for *few*-quantifiers, this gives unintuitive results for these quantifiers when they scope over universals under the inverse scope interpretation. In such cases, as argued at the beginning of the section, it doesn't seem that non-emptiness can be assumed.

Moreover, assuming non-emptiness for universals and emptiness for *few*-quantifiers cannot in general be the case, and positing a rift between the two types of quantifiers is not theoretically appealing. Consider the sentence, and its two (distributive) scopal interpretations.

15. Few students have sold all their belongings.
  - a) A group of students (of low cardinality) sold all their belongings.  $(F > \forall)$
  - b) Each belonging is such that (a possible different) group of students (of low cardinality) sold it.  $(\forall > F)$

Let us focus on the surface scope reading, (15a). Note that the restrictor of the universal quantifier in object position depends (as to its semantic value) on the *few*-quantifier, since the pronoun *their* in the former is bound by the latter. It then follows that if the domain of the *few*-quantifier is empty, the domain of the universal should be empty as well. This is so because if there are no students satisfying the relevant property (viz. the property of people who have sold their belongings), naturally, there are no belongings to speak of, and thus the domain (*qua* restrictor) of the *few*-quantifier in the object position is empty as well. (We thus eliminate impossible worlds where there are zero students, but these students possess nevertheless a non-empty set of belongings.) We can thus see that positing emptiness for

*few*-quantifiers and non-emptiness for universal quantifiers will not do in this setting, and so is not an option in general. It seems more natural to assume that, in general, both types of quantifiers imply non-emptiness as a default, falling back on emptiness only when the contextual information requires it.<sup>12</sup>

I tentatively conclude that the emptiness assumption is incorrect. Then, the inverse scope *few* determines (something akin to) a presupposition failure in neutral contexts, and thus the inverse scope cannot simply be entailed by the surface scope. The strong economy advocates need somehow to accommodate the non-emptiness assumption, or, otherwise, argue for the emptiness assumption.

#### 1.2.1.2 Potential replies

Let us evaluate more systematically the options available to the strong economy theorists. The GSEC theorists can defend the thesis by making one of the following moves.

16. reject non-emptiness for at least some downward entailing operators.
17. assume non-emptiness, but at a level that does not interfere with GSEC;

The reply (16), which rejects the non-emptiness presupposition (or implication), might appeal to examples of downward entailing operators whose restrictors are empty sets. The most obvious example is the negation operator, in one of its forms. Thus, for example, the semantic value of *no student* can be built on the basis of an empty domain (i.e., the intersection of the semantic value of its restrictor *student* and its nuclear scope, e.g. *is bald*), thereby making the corresponding utterance—for instance the utterance of *No student is bald*—true. Now, it might be claimed that the other downward entailing operators we have been considering are similar to negation in that they are compatible with empty domains. But the negative quantifying determiner always requires empty domains, whilst this is not the case with other downward entailing operators. It is not clear that quantificational phrases consisting of other negative determiners such as *few* and *less than three* (which express downward entailing operators) can always accommodate empty domains. For instance, it does make sense to say things such as *few if any*, *less than three but non-zero*, which suggests that there is a contrast to be drawn between the interpretation of these downward entailing operators (*few*,

<sup>12</sup> This conclusion is reinforced by the fact that there is no contrast in the intuitive existence presuppositions of utterances consisting of *all students* and *few students*. (See also the discussion below.) Furthermore, there is also perfect symmetry between (15) and constructions that have the universal in the subject position and the *few*-quantifier in the object position, e.g. *Every male student sold few things that belonged to him*.

*less than three*) and expressions indicating emptiness or null extension (*if any, zero*). Of course, this does not hold for all the cases involving downward entailing operators: *less than 1* may very well imply *zero* in contexts where rational number evaluations are excluded.<sup>13</sup> However, this is the exception rather than the rule, and in neutral contexts non-emptiness implications seem to go through. Otherwise put, there is a (cancellable) non-emptiness implication triggered by *few*, *less than*, and other similar downward entailing quantificational determiners.

Another option is to say that *few* indeed requires a non-empty domain, but only *after* the application of the strong economy principle. This is the strategy of response (17), according to which the strong economy computation is modular. This view can cast the non-emptiness implication of *few* (and other downward entailing determiners such as *less*) as scalar implicatures. On this view, these downward entailing operators do not rule out the emptiness reading on semantic grounds, but rather on pragmatic grounds. For instance, if *few* were a scale-mate of the stronger operator *no*, a use of the former would implicate that the latter shouldn't be used. In other words, *few* would implicate non-emptiness. As long as we assume that the implicature mechanism and the economy principle regulating scope are independent, the predictions of strong economy should go through. However, this strategy is not completely satisfactory, as there are cases where scope does interact with implications (in particular, with presuppositions). For instance, Heim (2000) makes use of presuppositions in order to knock out some scopal possibilities. In other words, she uses the interactions between scope and presuppositions. This suggests that presuppositions do interact with scope, and thus we need an explanation as to why the interaction doesn't occur with the strong economy principle.

Moreover, once we allow for implicatures, it is not clear that the inverse scope reading exists as an independent syntactic scopal structure prior to the computation of scalar implicatures rather than as an

13 The context sensitivity of *few* is a broader phenomenon. It's interesting to note that *few* functions awkwardly as a left downward entailing determiner, whilst, as a right downward entailing determiner, it is much less problematic.

18. The inference fails more easily because the interpretation of *few* depends on the linguistic contexts provided by its restrictors.

a) Few [UEA students]<sub>B</sub> are [philosophers]<sub>C</sub>.

b) Few [UEA students in room 01.07]<sub>A</sub> are [philosophers]<sub>C</sub>.

19. The inference seems acceptable, since the interpretation of *few* can no longer be sensitive to the determiner's restrictors, which are identical in the two cases.

a) Few [philosophers]<sub>C</sub> are [students]<sub>B</sub>.

b) Few [philosophers]<sub>C</sub> are [UEA students]<sub>A</sub>.

To my ear, there still is a marginal interpretation in which *few* varies with linguistic context provided by the expressions in the VPs of the constructions above. This interpretation is not very salient though.

interpretation that results from cancelling the non-emptiness scalar implicature when the context requires it. It is simply unclear whether the inverse scope *few* is really available. The argument in favour of GSEC rehearsed above, by its very phrasing, just invites us to accommodate contextually the assumption that there might not be objects in the domain of *few*. It amounts to saying something like the following: “but of course if there are few students in each classroom that go to the olympiad, this entails that there will be even fewer students—zero, at the limit—that are from all the classes and go to the olympiad”. Once we make this assumption, we naturally get an entailment that simulates the inverse scope. But the purported availability of the inverse scope seems to be a by-product of the contextual setting, rather than a *bona fide* syntactically encoded scopal possibility.

Note also that there is a cost to assuming that there is a mismatch between our clear intuitions about the scope and implications of the determiner *few* and its assumed ‘modular’ characteristics. All things being equal, such a mismatch just means a more cluttered grammar of scope. But (17) is based on the assumption that there is such a mismatch between the modular entailment available to the economy-computation of structures containing downward entailing operators of the *few* variety (that satisfy emptiness), and the entailment of the *few*-operators that seem to be more generally accessible (and seem to satisfy non-emptiness).

A related escape route for the strong economy theorist amounts to saying that even if downward entailing operators such as *fewer than three* come with a non-emptiness implication, the opposite implication can be accommodated by the audience. This response is attractive since it seems to fit the better understood case of doubly quantified sentences with an upward entailing operator such as *some* or *a(n)*. Thus, when evaluating an utterance of *Every tutor is impressed by a student*, the hearer may take for granted that the set of students who impressed every tutor is non-empty, and this is presumably what a principle of economy needs in order to allow the inverse scope of the above sentence. But if we let accommodation enter the definition of entailment that GSEC appeals to, this would trivialise the principle, since many other assumptions could then be accommodated. For instance, we could accommodate the inverse scope of  $(\forall > \exists)$  which is one of the (stronger) scopal possibilities that GSEC wants to rule out. If one endorses the accommodation option, one needs to say why some other quantificational phrases do not trigger accommodation.<sup>14</sup>

I conclude that the problems discussed above seem to have crippling consequences for the strong economy account, since an important part of its data set is based on sentences containing the deter-

<sup>14</sup> Another issue is that accommodation should be properly argued for, and, a mechanism for triggering it should be spelled out. It is not clear that the sort of local accommodation targeting the restrictor of the quantificational determiner really exists (cf. von Stechow 2004).

miner *few* and other similar downward entailing operators in object position.

### 1.2.2 Problematic predictions

For the purpose of systematically assessing GSEC, I shall settle on a number of key guidelines. There are at least four types of claims that can serve as counter-evidence to the strong economy principle. (One may skip this classification on the first reading, as the counterexamples are understandable on their own.)

- Downward entailing operators appear in two positions, as subjects and objects, respectively. Each such position can project stronger meanings, namely, when (a) a subject downward operator crosses a universal QP, and (b) when an object downward operator crosses negation. **Type 1 evidence**

The type 1 evidence would amount to showing (a) that in the first sentence negation can take scope under the quantifier phrase *each single point*, and (b) that in the second sentence the downward entailing *few*-quantifiers can take scope above negation.

18. a) John didn't grant each single point that Mary did.  
b) John didn't invite few/fewer than three colleagues.

- Upward entailing operators can give birth to stronger meanings too. Likewise, there are two positions in which upward entailing operators can appear and generate a stronger meaning under the inverse scope reading. Stronger meanings are generated (a) when the subject upward operator crosses negative operators, and (b) when the object upward operator crosses universal QPs. **Type 2 evidence**

Consider the following potential type 2 evidence.

19. a) All the boys didn't leave.  
b) Everyone loves someone.

If we can show that there are inverse scope readings for the above sentences, we thereby show that stronger inverse scope readings are possible.

- Operators that have none of the monotonicity properties above can generate stronger (or weaker) meanings too, so they are equally relevant to testing strong economy. When a non-monotonic object operator crosses a universal quantifier, a stronger reading ensues. **Type 3 evidence**

As is well known, quantifiers such as *an odd number of cards* and *exactly three cards* are non-monotonic. Here is then a potential type 3 counterexample to strong economy.



20. Everyone saw exactly three cards.

If we can find a reading on which the same set of (exactly) three cards was such that everybody saw these cards, it follows that a stronger inverse scope reading of (20) is possible.

- Indirect evidence against GSEC can be obtained if the inverse scope reading with downward entailing operators is awkward even in the absence of strengthened meanings, or when the strength or weakness of the generated scopal meaning doesn't appear to have anything to do with (i.e., doesn't covary with) the availability of scope. **Type 4 evidence**

I shall consider evidence of the following kind.

21. a) I thought your cookies were (/were not) fewer than they were.

b) Every girl read fewer than three books.

Assuming that comparative constructions involve scope-taking operators, we need to show (a) that the negation operator in the first sentence does not have any effect on the scopal possibilities of the sentence, and (b) that there is a potential inverse scope reading of the second sentence which is weaker but nevertheless unavailable.

By following these guidelines, I shall show that the GSEC has a number of *prima facie* counterexamples of types 1–4.<sup>15</sup> As we shall see, there are several heterogeneous sets of data within each type of example. Importantly, some counterexamples are stronger than others; some of them are direct counterexamples and some others pose only indirect problems for the strong economy account. Nevertheless, these pieces of evidence jointly show the limitations of the strong economy hypothesis.<sup>16</sup>

#### 1.2.2.1 Economy problems

Since strong economy is based on Scope Economy (SE), it is worth checking whether the strong economy inherits the problems of SE.

<sup>15</sup> Mayr and Spector (2010) look at several examples of type 1a and 2a-b, but they disregard data of type 1b, 3, and 4. However, I shall argue that these provide a genuine testing ground for strong economy, and, in fact, disconfirm it.

<sup>16</sup> As will become clear, there are many potentially relevant data, and in the interest of keeping the chapter within a reasonable length, I shall discuss in detail only the strongest and the most theoretically interesting ones. Some of the counterexamples will be discussed only very briefly (e.g. counterexamples of type 2b) or not at all (e.g. counterexamples of type 3 seem to me to be both self-evident and sufficiently similar to the type 2b counterexamples to be passed over), and yet others will be left for discussion in appendix A. Moreover, in appendix E I present an experiment that supports—*contra* GSEC—the scopal flexibility of the constructions (8b) and (10b).



The argument for (SE) was based on assuming the principle of parallelism. But this principle, as D. E. Johnson and Lappin (1999) note, seems to fail in the following examples:

18. Data from D. E. Johnson and Lappin (*ibid.*, pp. 43-44)
  - a) At least one Labour MP attended every committee meeting, and Bill did too.
  - b) At least two cabinet members bear responsibility for each government department, and Tony Blair does too.
  - c) At least one natural number other than one divides into every prime number, and one does too.

It seems the inverse scope reading of the non-elliptical (first) clauses are possible, despite the argument put forward by Fox (2000). These data call into question, along with Parallelism, the principle of scope economy itself. It may very well be that Parallelism works well, but that the principle of economy fails altogether in such contexts.<sup>17</sup> A proper defence of the SE principle and, indirectly, of the strong economy principle needs to accommodate the problematic data above. I assume for the moment that Parallelism fails for some (perhaps pragmatic) reason in such cases, but that the economy principles are on the right track. I note that the scopal possibilities in the first sentences (in each of the pairs) are partially compatible with strong economy, since their inverse scope readings are not stronger than the surface scope readings. However, this is not always the case.

An economy-related (type 2b) problem of GSEC is that it doesn't account for the good predictions of the standard Scope Economy.<sup>18</sup> Thus, on a reasoning based on the original scope economy account, the construction (19)

19. Every tutor admires some student, and Mary does too.  
 $(\exists > \forall), ??(\forall > \exists)$

fixes the scopal structure of the otherwise ambiguous first clause *Every tutor admires some student* by imposing upon it the parallel sco-

<sup>17</sup> Perhaps such a conclusion is too hasty. One may hold that it is due to the failure of Parallelism that these examples are not predicted by the two principles, Parallelism and Scope Economy, taken together. I don't know of any argument to this effect, and until one is provided, it would be fair to say that Scope Economy is problematic. (But I shall not defend the claim that the SE hypothesis is wrong, since there are some data supporting it. Short of claiming without argument that the data in question are noisy, we better not rule out SE for the moment.)

<sup>18</sup> Strictly speaking, this is not a prediction that Fox (2000) makes explicitly, but it is in the spirit of his account. See Fox (*ibid.*, 109ff.) where, in dealing with the principle of binding economy, Parallelism is formulated in terms of the notions of same dependency relation or, importantly, in terms of the notion of identical reference (truth-conditional content). Formulating Parallelism in terms of truth-conditional content or entailment patterns (rather than in terms of a syntactic notion) is precisely what we need in the present case.

pal structure of the ellipsis sentence. But this amounts to a strengthening of the scopal interpretation of the first clause, which is precisely what GSEC predicts cannot occur.

In fact, the economy case above points to an even simpler case that doesn't seem to be handled by strong economy:

20. Everyone loves someone.  $(\forall > \exists) (\exists > \forall)$

If we consider that *everyone* and *someone* are proper scope-taking expressions (as seems plausible), this simple construction is a clear (type 2) counter-example to strong economy. Note that the inverse scope reading, which entails that there is a person who is loved by everyone, is stronger than the surface scope reading, according to which everyone is loved by someone, but not necessarily the same person. If the former reading is true, the latter is automatically true as well.

Moreover, note the following contrast

21. *Proper names freeze scope much more clearly than DE operators do*
- a) Some phd students admire every professor, and John does too.  $*(\forall > \exists) (\exists > \forall)$
  - b) Some phd students admire every professor, and few undergraduates do too.  $(?)(\forall > \exists) (\exists > \forall)$

Let us continue to assume that Parallelism works well in most of the cases, including the present one. Now, if subject position downward entailing operators block the inverse scope over an universal quantifier (due to the generation of a stronger scopal reading), then the above contrast should be surprising on the strong economy view. Even assuming that the inverse scope existential reading is rather marginal in (21b), that reading is much better than the corresponding inverse scope reading in (21a). I find the inverse scope reading of (21b), in which each professor is admired by a group of phd students or other and also by a group of few undergraduates, acceptable. However, as standardly assumed, the inverse scope reading of (21b) is clearly impossible. The contrast remains unexplained on the strong economy view.

#### 1.2.2.2 Antecedent contained deletion

Let us study the antecedent contained deletion (ACD) data. The ACD constructions involve ellipsis, which is sometimes viewed as the deletion of phonological material (or pronounceable phrases). The deleted material is nevertheless crucial for the interpretation of the

sentence. The following ACD constructions are direct (type 1) evidence against strong economy. We adapt our examples from Pesetsky (2000, pp. 33-38) by adding the negation operators.<sup>19</sup>

A caveat is in order before beginning. ACD constructions are complex enough on their own, and, as far as I know, they haven't been considered in connection with scopally commutative operators of the kind I am interested in. This is why I am uncertain as to the right 'surface scope' reading of the ACD constructions.<sup>20</sup> However, as we shall see, the syntactically accurate representation of the 'surface scope' is immaterial to the main purpose of the present argumentation. I am primarily interested in the (uncontroversial) inverse scope readings, and the controversial syntactic representations of the 'surface scope' will not play an essential role in my analysis of the ACD cases.

22. Mary didn't invite everyone that I did  $\Delta$ .  $(\forall > \neg), (\neg > \forall)$   
 a) [everyone that I invited t] [Mary didn't invite t].  $(\forall > \neg)$   
 b) [Mary didn't invite t] [everyone that I invited t].  $(\neg > \forall)$

Building on the 'deletion' assumption, if we add the phonologically deleted material, (22) ends up saying something akin to the following: Mary didn't invite everyone that I did [invite everyone that I did invite ...]. The ACD cases are interesting because, on the face of it, they produce infinite regress. In (22), the VP of the main clause, *invite everyone that ...*, contains the VP of the embedded clause, *did invite everyone that ...*. But the latter VP depends on the former VP (the latter VP can be seen as a copy of the former VP), and therefore an infinite regress is generated. (In other terms, the former VP is the antecedent and the latter VP—contained by the antecedent—is deleted, and hence remains unpronounced. This is why this form of elided construction is taken to involve antecedent contained deletion.)

To avert regress, the standard way of representing the scope of these elided sentences is with the universal quantifier taking precedence over the clause which has *Mary* as subject, and thus over the negation, as shown in (22a). This is precisely the reading that GSEC disallows, since it's stronger. Hence, we have another straightforward (type 1a) counterexample to strong economy. The other reading, which we represented tentatively in (22b)—but very likely needs revision—has negation taking scope over the universal. This reading is allowed by GSEC, and is perhaps more salient than the previous one.

19 The examples corresponding to my (adapted) (25) and (26) are credited to Kennedy (1997) and Danny Fox (p.c.) respectively.

20 By 'surface scope' (in quotation marks) I mean that the relative positions of the operators is as it appears on the surface, regardless of whether some transformation applies to it at LF or not. So, I don't mean that there is no covert movement (or other transformation) involved in such constructions, but only that even if there were covert movement, there would still exist a reading with the same relative position of operators as the one displayed by the linear arrangement on the surface.

The same pattern occurs with other ACD constructions.

23. John didn't agree to visit every city Mary did  $\Delta$ .

$(\forall > \neg), (\neg > \forall)$

- a) [John didn't agree to visit t] [every city Mary visited t].

$(\neg > \forall)$

- b) [every city Mary agreed to visit t] [John didn't agree to visit t].  $(\forall > \neg)$

24. John didn't grant each single point that Mary did  $\Delta$ .

- a) [John didn't grant t] [each single point that Mary did t].

$(\neg > \forall)$

- b) [each single point Mary did grant t] [John didn't grant t]

$(\forall > \neg)$

These sentences, as with the preceding one, admit two scopal readings. The inverse scope reading, (23a), is available, contrary to what GSEC predicts. According to the inverse scope reading, (23) entails that each city is such that Mary wanted to visit that city, whilst John refused to visit it. Perhaps this inverse scope reading is more clear in (24) proposed above: *John didn't grant each single point that Mary did  $\Delta$* . The inverse scope reading thus says that *no single* point that Mary granted was also granted by John. Clearly, this is stronger than saying that *not every* point that Mary granted was also granted by John.

Another similar case is given in (25).

25. Beck didn't read a report on every suspect Kollberg did.

$(\forall > \neg), (\neg > \forall)$

- a) [every suspect Kollberg read a report on]<sub>x</sub> Beck didn't read a report on x.  $(\forall > \neg)$

- b) Beck didn't read a report on x [every suspect Kollberg read a report on]<sub>x</sub>.  $(\neg > \forall)$

The stronger, inverse scope reading is available. Since GSEC states that stronger inverse scopes are unavailable, the above construction is another direct counterexample to strong economy. The inverse scope of (25) says that Beck didn't read a report on *any* suspect that Kollberg did. The other reading is weaker. It says that Beck didn't read a report on *every* suspect that Kollberg did, but Beck possibly read a report on some such suspects.

Supposing that the ambiguity of the following sentences is a matter of scope, these sentences add up to the set of counterexamples to strong economy.

26. a) Kollberg didn't want every book that Mary wrote.

*de dicto, de re*

- b) Kollberg didn't want every book that Mary did  $\Delta$ .  
only *de re*

Both (26a) and (26b) admit a stronger, inverse scope reading, namely the *de re* reading of the universal quantifier (and in the latter the *de re* reading is obligatory). According to the *de re* reading, every book that Mary wrote (at the actual world) is a book that Kollberg refuses to read. The contrasting, *de dicto* interpretation amounts to saying that Kollberg refuses to read whatever book Mary writes.<sup>21</sup>

### 1.2.2.3 Comparatives and comparative quantifiers

Let us look at the interaction of comparative quantifiers and intensional operators. Consider the 'yacht' sentences, inspired by Russell (1905), which are of the form *I thought your yacht is larger than it is*.

27. You must have prepared fewer cakes than you did.  
 $?( \Box > \exists_c ), ( \exists_c > \Box )$
28. The/some cakes you cooked could have been fewer.  
 $?( \Diamond > \exists_c ), ( \exists_c > \Diamond )$
29. Some cakes you have cooked should have been fewer.  
 $?( \Box > \exists_c ), ( \exists_c > \Box )$
30. You could not have prepared fewer cakes than you did.  
 $?( \Diamond > \exists_c ), ( \exists_c > \Diamond )$
31. You should not have prepared fewer cakes than you did.  
 $?( \Box > \exists_c ), ( \exists_c > \Box )$
32. You had to prepare as many cakes as you did.  
 $?( \Box > \exists_c ), ( \exists_c > \Box )$
33. You didn't have to prepare as many cakes as you did.  
 $?( \Box > \neg ), ( \neg > \Box )$

In the examples where the strong (and sometimes necessarily false) readings are associated with the inverse scope, we get clear counterexamples to GSEC, since the strong readings under inverse scope

21 Mayr and Spector (p. 12) remark that the possibility of a *de re* reading is problematic only if we keep fixed the extension of the relevant predicate, in our case *book*. It seems to me that we can do that, and if we do, we get a counterexample. Moreover, on reflection, it doesn't seem to exist any real contrast between interpreting the sentence in (26a) under the assumption of a fixed domain of books as opposed to interpreting them under the assumption of a variable domain. Just consider a context where both Kollberg and Mary are concerned with the set of books that Mary authored and are on Kollberg's shelf. Then contrast this with a context where Kollberg is wrong about which book Mary authored; in this context the set of books that Mary authored at the actual world and Kollberg's bouletic worlds have distinct extensions.

are still acceptable, even if non-salient. Such counterexamples are (28)-(29), and (30)-(31).

To illustrate, (28) seems to admit the wide scope modal reading, which says that it is *possible* for you to cook fewer cakes than you cook. (29) says that the same situation *must*—rather than *can*—be the case. Of course, the proposition that these readings find possible and necessary (respectively) is contradictory, so both modal readings are necessarily false. These readings seem to me to be available—I can definitely see them used as grammatical jokes. But if such readings are in effect available, they constitute type 1 counter-evidence to GSEC, because necessarily false sentences asymmetrically entail everything modally contingent.

Moreover, consider the same sentences except that we introduce a negation in the scope of the modal (so that the cakes in question *mustn't*, *couldn't* ...). In this case, the propositions in the scope of the modal become necessarily true on the inverse scope modal reading (therefore as weak as we can get). Yet, the inverse scope readings are not more (or less) salient than under the previous condition. This shows that the strength of the scopal readings of comparative quantifiers under modals has no influence on scopal accessibility, which constitutes another piece of type 4 data against strong economy.

An interesting pair of (type 4) examples is (32) and (33). The surface scope reading of (32) is as weak as it can get, whilst the surface scope reading of (33) is as strong as it can get. According to GSEC, there should be a contrast in the scopal possibilities of the two sentences. This is because a double-operator sentence which is necessarily (and trivially) true under the surface scope reading is bound to have a *stronger* meaning on its inverse scope reading. In contrast, a double-operator sentence which is necessarily false (and thus trivially false) under the surface scope reading, is bound to have a *weaker* reading under inverse scope. However, there is no contrast between sentences whose surface scope interpretations are trivially true and trivially false, respectively. Both types of sentences admit a salient inverse scope reading, as clearly shown by the examples (32) and (33).

Thus, the scopal readings of these ‘yacht’ examples vary in ways that are explanatorily independent from the GSEC mechanism.

We move now to the interaction of comparatives with non-intensional operators. This requires some background on the semantics of comparatives.

There are two basic approaches to comparatives: the  $A/\neg A$  (e.g. Schwarzschild 2008; Seuren 1973) analysis and the maximality analysis (e.g. Hackl 2000; Heim 2000; von Stechow 1984). On both approaches, comparatives involve operators (a negation or a maximality operator) that are capable of entering into scope relations with other operators. As Alrenga and Kennedy (2014, pp. 4-5) remark, if the comparative constructions involve operators that engage in scopal

interactions, these scopal interactions should manifest properties that resemble the scopal properties of non-comparative constructions. It is then worth checking whether the scopal interactions of comparatives abide by strong economy. In the following discussion, I am focusing on the second approach, which appeals to a maximality operator.<sup>22</sup>

On the maximality approach, comparatives consist of two quantifiers, a degree quantifier and a definite quantifier. The definite quantifier fixes a set of degrees whose maximum is to be compared to the maximum of another set which is the restriction of the degree quantifier. For instance, we can analyse the comparative sentence *More than two students came to the party*, by comparing the set of students who came to the party with the set of two people. The comparison will be in fact between the maximums attained by the above sets. It is convenient to assume an abstract unit for measuring the cardinality of the sets; for this purpose, we use degrees. Thus, the comparative quantifier will compare the degree 2 (two) expressed by its restriction (the set of two students) with the degree of the set determined by the definite (the set of students who came to the party). The comparative quantifier will yield truth just in case the latter set, the set of students who came to the party, is associated with a degree higher than two, the degree associated with the former set, namely the set of two students.

On these plausible assumptions, GSEC encounters what is called in the literature *van Benthem's problem* (see Hackl 2000, 162ff.). The problem is that if we are assuming that the definite quantifier has the scopal flexibility standardly assumed for quantifiers, then, in certain circumstances, we obtain a weak scopal reading which is unattested.

34. *Unavailable weak inverse scopes (van Benthem's Problem)*

Hackl (*ibid.*, p. 162)

- a. Fewer than three students came to the party.
- b.  $\llbracket a \rrbracket = 1$  iff  $\exists X[\max \{d : X \text{ is a } d\text{-numerous set of students}\} < \max \{d : d = 3\} \ \& \ X \text{ came to the party}]$
- c. There is a set of students (X) whose cardinality is smaller than three and that came to the party.

Thus, in constructions where the definite quantifier (part of the comparative constructions) combines with a decreasing operator, we get a wide scope definite reading. This reading is the weakest possible reading for this construction, and is hence predicted to be available by strong economy. However, the reading is clearly not acceptable. The sentence *Fewer than three students came to the party* cannot be judged true simply because we can pick out a set of less than three students who didn't come to the party.

<sup>22</sup> However, strong economy is challenged by any account which endorses Kennedy's Generalisation, including the first account—see Alrenga and Kennedy (2014) for a review of the relevant data, as well as our discussion at the end of this section.



Many theorists (irrespective of their particular approach to comparatives) accept what Heim called *Kennedy's Generalisation*, to the effect that a quantificational phrase which contains the trace of a degree quantifier also contains the degree quantifier itself (Alrenga and Kennedy 2014; Heim 2000, 2006). Now, as Hackl (2000, 174ff) pointed out, this generalisation entails that *fewer than* degree quantifiers cannot take scope outside universal quantifiers.

35. *Decreasing comparative quantifiers in object position do not out-scope universal quantifiers* (Hackl (*ibid.*, p. 175))

a) Every girl read fewer than three books.

\*(fewer >  $\forall$ ) ( $\forall$  > fewer)

b) Every girl read fewer books than journals.

\*(fewer >  $\forall$ ) ( $\forall$  > fewer)

Imagine that someone utters (35a) about a situation in which there are two girls who read two different books each, and thus four books in total—we set up the context so as to use the *collective* reading: the girls collectively read four books. There are two (logically possible) inverse scope readings corresponding to the distributive and collective readings.<sup>23</sup> According to the first inverse scope interpretation, the utterance would be false in the envisaged situation, because it's not true that the girls read fewer than three books (by hypothesis, they read four books altogether). Yet, intuitively, (35a) cannot be judged false in such a situation. A different problem occurs with the second (distributive) inverse scope interpretation of (35a). That interpretation would be true in a situation in which one of the girls read four books but the greatest number of books that each of the girls read is less than three. However, we don't get this reading from (35a).

These inverse scope readings should be nonetheless available by the lights of strong economy, since these readings are weaker than their surface scope alternatives. As we have seen in the analysis of their main supporting data (8)–(12), strong economy theorists have it that downward entailing operators (e.g. negation, *few* etc.) in object position can freely cross universal quantifiers, in contrast to the universal quantifiers in object position which cannot cross downward entailing operators. But in the above examples, we see that the downward entailing *fewer than three books* cannot take scope above the quantifier.

23 Here are the representations of the two unavailable, inverse scope readings of (35), as put forward by Hackl.

36. Every girl read fewer than three books. Hackl (2000, p. 175)

a)  $\text{*max}\{d : \forall x[\text{girl } x \rightarrow \exists Y[Y \text{ is } d\text{-many} \ \& \ \forall y[y \in Y \rightarrow x \text{ read } y]]] < 3$

b)  $\text{*max}\{d : \exists Y[Y \text{ is } d\text{-many} \ \& \ \forall y[y \in Y \rightarrow \forall x[\text{girl } x \rightarrow x \text{ read } y]]] < 3$



The key problem is that strong economy clashes with Kennedy's Generalisation and the standard semantics for comparative quantifiers. This is a serious problem, since comparative quantifiers, and, in particular, monotone decreasing comparative quantifiers were among the data that motivated GSEC in the first place. I have already observed that the distributive readings of *few* are problematic for strong economy, and now we see that the collective readings give rise to problems too.

More generally, it is clear from the statement of Kennedy's Generalisation that this principle crosscuts strong and weak scopes. Since the generalisation is not formulated in terms of entailment-related semantic properties of operators, it is to be expected that both strong and weak scopes will be (dis)allowed, in ways that do not correlate with strong economy. This property effectively makes the data governed by Kennedy's Generalisation type 4 counterexamples to strong economy.

As we suggested, comparatives are problematic on any of the two mainstream accounts. In particular, the results of the two accounts of comparatives match in that they need a special stipulation to rule out a scopal reading (see Alrenga and Kennedy 2014, p. 13). Both the  $A/\neg A$  and the maximality accounts have problems with constructions such as *John is taller than each of his students*. These accounts predict that the inverse scope reading is possible. That is, they do not rule out the reading according to which John is taller than the smallest of his students. This reading is clearly unavailable for our example, but strong economy predicts it should be available. The only available reading is one on which John is taller than the tallest of his students, and thus he is taller than each of his students.

Tellingly, van Rooij (2008) tries to solve this problem by ruling out the *weaker* meaning. To this effect, he adopts a principle called the Strongest Meaning Hypothesis. Although this principle has to meet several challenges (see Alrenga and Kennedy 2014, pp. 10-1), for our purposes it is important to note that the Strongest Meaning Hypothesis is exactly the opposite of GSEC. It rules out the weaker meanings and rules in the stronger ones. When we encounter two contradictory principles dealing with the very same phenomenon, namely, scope, we can be sure that we haven't stated the right generalisations.

A further problem with GSEC, is that it doesn't predict the interpretations of the following sentences (from Bhatt and Takahashi (2011, fn. 18) cited in Alrenga and Kennedy (2014, pp. 4,27)).

36. More students have read *Lord of the Rings* than have read every other Tolkien novel.  
 $(\forall > \neg), (\neg > \forall)$  Alrenga and Kennedy (*ibid.*, p. 27)
- a) the number of students who have read LOTR exceeds the number of students who have read all of the other Tolkien novels.  $(\neg > \forall)$

- b) the number of students who have read LOTR exceeds the number of students who have read the most-read Tolkien novel other than LOTR. ( $\forall > \neg$ )

The complete logical forms of these sentences are given in Alrenga and Kennedy (2014, p. 27). Here we abstracted away from the syntactic details, and captured only the relative positions of the negation and universal quantifier. The negation is justified on their (A/ $\neg$ A) analysis since it means that there is a degree to which students read LOTR such that that degree is *not* attained by students who read any other novel. Assuming that this analysis is on the right track, the (36a) reading is stronger than the (36b). For if a novel (namely, LOTR) is read more than all of the other novels (N – LOTR), that novel (namely, LOTR) is surely read more than the second most-read novel (which is only a single novel among the N – LOTR novels).

Further examples problematic for strong economy are documented in the appendix B.

### 1.2.3 Defence strategies and their key drawbacks

There are several lines of response to the sort of cases we considered to be problematic for the economy principles (cf. Mayr and Spector 2010). We focus here on two such strategies.<sup>24</sup>

Mayr and Spector explain away some apparently recalcitrant data by arguing that they involve overt movement, and, in particular, adjunction to the right edge. Their basic idea is that when the quantifier in the object position is in the rightmost position (and there is no other phrase, e.g. adjunct, that follows it), then that quantifier can overtly take scope over the operator in subject position by movement to the right. The position where the quantifier is thus moved is truth-conditionally identical to the inverse scope reading, but is actually obtained through overt movement. To argue for this, they demonstrate a contrast between scopal constructions with relative clauses vs adverbial phrases to the right of the quantifier in object position.<sup>25</sup>

<sup>24</sup> There are several other problems of varying difficulty with GSEC. Many of them are discussed by Mayr and Spector (2010), involving for instance the scope of ‘neg raising’ intensional operators, indefinites. I haven’t relied on such cases in arguing against GSEC, but the proposed solutions to these problems imply the same methodological drawback implied by solutions to the problems I have pointed out. The methodological problem is the lack of generality of strong economy (see below for discussion). An important challenge not touched upon by strong economy theorists has to do with numerical operators. For our part, we skipped over the numerical cases (although we discuss a relevant case, (31), in the second appendix) mainly because the semantics of numerical expressions involves a notion of entailment that is more complicated and needs more spelling out than the non-numerical cases discussed here.

<sup>25</sup> For instance, notice the contrast between *John didn’t meet every guest on time* and *John didn’t meet every guest that came to the party*, where only the latter makes available an

The adverbial phrases block a reading in which the quantifier takes scope over the operator in subject position.

However, this move seems to me suspect because the argument from right edge adjunction can also be run with configurations that (are traditionally taken to) give rise to inverse scope through covert movement, e.g. *Someone loves everyone* ( $\exists\forall$ ). Arguably, precisely the same contrast between the addition of relative clauses vs AdvPs obtains. Does this mean that the relevant movement of the universal is in fact overt? Probably not, as the standard type of movement for such constructions—covert movement—is sufficient to produce the desired truth-conditional effect.<sup>26</sup> If so, the difference produced by inserting an AdvP, as opposed to a relative clause, does not need to be indicative of right edge adjunction, as it also occurs with standard covert movement constructions. Something more should therefore be said in order for the argument from the right edge to go through. A potential response to these challenges is to say that in order to avoid a violation of GSEC, grammar deploys right adjunction as a ‘last resort’ to the same truth-conditional effect.

A related line of defence is to see strong economy in competition with other grammatical constraints or principles, e.g. movement to solve ACD, Kennedy’s Generalisation etc.. Accordingly, in order for strong economy to license one of the competing LFs in the reference set, the grammar must check that strong economy is not outranked by other grammatical principles. This move further complicates the grammar of scope, but it vindicates strong economy. While these supplementary assumptions might seem sound, they imply that an even more complicated computation takes place at the interface.

Perhaps the strong economy can be defended along the lines suggested above. However, this is small relief to strong economy. There still remain plenty of counterexamples that should be mitigated by an adequately restricted notion of strong economy. Let us summarise the genuine counterexamples to the *restricted* strong economy. To defend strong economy we have to tackle the empty-domain problems noted in §1.2.1. Furthermore, we have to accommodate the economy-related problems in (18), (19), and (21), the type 1a and 2a counterexamples in (30), the scopal behaviour of NPIs in (32), the definites and existentials in predicative positions in (33) (see appendix B), the type 4 problems in (27)-(31) and (33), the ACD (type 1a and 4) counter-evidence in (22)-(26), and, finally, the comparative cases in (34), (35)-(36) and (36).

A more general drawback is that each of the above argumentative moves makes the GSEC principle less general and thus theo-

---

inverse scope reading for the object position quantifiers. The contrast can be traced back to the addition of AdvPs (e.g. *on time*) vs relative clauses (e.g. *that came to the party*), because only the latter ensures that the quantifier is on the right edge.

<sup>26</sup> Right edge adjunction would remove the sentence *Someone loves everyone* from the domain of strong economy, which governs only covert movement.

retically less interesting. As I suggested, generality was one of the rationales for positing economy, and it is standardly taken as a theoretical virtue. To see why it is not justified to resist generality at any price, notice that, at the limit, each new counterexample that we may come up with can be mitigated by assuming that strong economy loses in competition with yet another grammatical principle or constraint. This is problematic. For it is not clear which grammatical principle can be said to compete with strong economy in each of the above counterexamples (and the ones in the appendix). But more importantly, if GSEC loses in competition with so many grammatical constraints—some of which pull precisely in the opposite directions, e.g. Kennedy’s Generalisation—this is a good indicator that the strong economy principle is no more than a descriptive principle that applies to a very limited set of data, and thus needs to be subsumed under a more general and explanatory principle.

### 1.3 CONCLUSION: A DEFLATIONARY SOLUTION

On closer analysis, strong economy is found to be wanting on both methodological and empirical grounds. This constitutes strong motivation to look for alternative accounts of scopal phenomena. In light of the previous data, and in the absence of further argument, only a weaker hypothesis is warranted. (A stronger, and more general, hypothesis will be proposed in the following chapter.)

The weaker hypothesis is twofold: (i) when the inverse scope reading of an utterance is stronger than the surface scope reading, and we fixate on the surface scope, then the inverse scope reading *can* be ruled out by a scalar implicature. Furthermore, (ii) when the inverse scope (reading) is weaker, and thus entailed by the surface scope, it is not possible, in light of standard assumptions about scales, to rule out the inverse scope by scalar implicature. These two clauses produce a contrast very much in the spirit of GSEC.

To illustrate, consider the sentence with the configuration (i): e.g. *Every teacher admires a pupil*. If we zero in on the surface scope interpretation (according to which there are possibly multiple pupils), we can conclude that there are multiple pupils, by excluding *via* a scalar implicature the stronger, inverse scope reading (according to which there is a unique pupil). It seems to me that we often get precisely this sort of interpretation, drawing a (defeasible) inference to the effect that there are multiple pupils that the teachers admire. On the other hand, if we interpret a sentence with a type (ii) configuration, say, *A pupil admires every teacher*, under the surface scope reading (which is stronger than the inverse scope reading), no scalar implicature can arise, so we cannot rule out the inverse scope reading on the basis of the scalar implicature. Admittedly, we may have other better

reasons for ruling out the inverse scope reading, which makes the evaluation of the proposal difficult to test. My point is that, on the assumption that these scalar implicatures interact with scope, there may be a subtle distinction between sentences with configuration (i) and (ii). In configurations of type (i) we have an *additional* reason to remove the inverse scope (although there may be other reasons to remove it, e.g. parsing considerations or background information).

Furthermore, the ruling out of the stronger, inverse scope readings in constructions containing the downward entailing operators *few*, *fewer* etc. (under distributive readings) can be construed as depending on implicitly introducing a quantity implicature and on a mechanism for removing inconsistencies. Recall the examples considered at the beginning of the chapter, (11b) and (12b). These have basically the same structure as the scopal construction *Few windows are always open*. Note first that the surface structure  $F\forall$  is compatible with  $\forall M$  (where  $F$  = few and  $M$  = many), since even if (the same) few windows are open at all times, it is still possible that at all times many (different) windows are open. Secondly, the inverse scope structure  $\forall F$  implicates  $\neg\forall M$ , which contradicts  $\forall M$ —a possibility that, as we have seen, is left open by the surface scope reading. Hence, the inverse scope reading, which produces the implicature that is inconsistent with the background assumptions, should be removed as long as these background assumptions are salient.

However, note that the ensuing hypothesis is weak: in clause (i) we say that it is *possible* to remove the inverse scope reading. This possibility is realised only when the inverse scope reading is salient in the context, and we already fixated on the surface scope. When these two necessary conditions obtain, it is easy to see that the inverse scope is indeed unaccessible. In neutral contexts, under the standard, left-to-right, direction of parsing, the surface scope is the most salient scopal reading. If we further think of alternative scopal readings, it is natural to obtain the inverse scope reading, which becomes part of the relevant scale and is then to be removed by implicature.

The possibility of removing the inverse scope reading is not always realised, as shown, for instance, in our discussion of the non-emptiness assumption. If we set up a context in such a way as to make it clear that the domain of the *few*-quantifier may be empty, the inverse scope is entailed by the surface scope. What happens in this case is that by accommodating empty quantifier domains we reverse the relevant scale, and the inverse scope becomes weaker rather than stronger (as in the general case, where non-emptiness would be assumed).

This is, to be sure, a provisional solution. However, it is important for our purposes to formulate a baseline hypothesis that partially vindicates the basic intuition behind strong economy. In the following

### 1.3 CONCLUSION: A DEFLATIONARY SOLUTION

chapter, I argue for a more ambitious account of scope, within which we can include the deflationary suggestion just introduced.

## 2 | A CONTROVERSY-BASED PERSPECTIVE ON SCOPE SALIENCE

### 2.1 INTRODUCTION: ECONOMY

This chapter argues that language is ideal or economical with respect to scopal interactions, and gives a rationale supporting this hypothesis. I build on the idea—already argued for in the recent literature in e.g. Fox (2000), Mayr and Spector (2010), and Reinhart (2006)—that scope-flexibility requires effects on meaning. The driving intuition behind such accounts is that scope can receive a structural treatment rather than a treatment based on the individual properties of each scope taking element. In particular, I share with the strong economy account (discussed in the previous chapter) the intuition that the explanation of scope phenomena is structural, and, moreover, that the relevant structural property is semantic strength (or entailment). However, I depart from previous conceptions about the economy of scope. My main claim is that the conception of broad grammar (including semantics and pragmatics) becomes simpler and more elegant if we put more weight on processing considerations and pragmatic principles. The outcome is not only a more elegant division of labour between syntax and semantics/pragmatics, but also a view that fares better with respect to linguistic data concerning the scopal behaviour of linguistic operators such as quantifiers, negation, and modals. Were one to try to accommodate scopal data within the strong economy approach, the economy-based account would become not only unduly complicated, but also incompatible with the original semantic/pragmatic motivation for positing economy principles.

The basic idea driving my proposal is that, if scope can affect entailment and implication patterns, entailment should be able to affect scope too.

I shall focus on contradictions in stating my pragmatic<sup>1</sup> economy account. But in contrast to several current accounts, I shall claim that contradictions play a more positive (or permissive) role. It is the purpose of this chapter to make more precise the permissive role of contradictions in the grammar of scope.

<sup>1</sup> The reader will be pleased to find out that I shall sometimes drop the ‘semantic’ qualifier from the somewhat irritating “semantic/pragmatic” label. This is not entirely for aesthetic reasons, since it emphasises that my principle is better suited to interact with contextual factors than its direct competitor.

There are two more specific theses that may be advanced on the basis of the coming discussion: (i) A conspiracy of semantic/pragmatic principles is better off than the strong economy principle (GSEC) both empirically and conceptually. (ii) *Any* economy-principle governing scope should be relegated to pragmatics. Note that (i) is compatible with the existence of principles of economy other than strong economy. I am here defending the latter claim, (ii).<sup>2</sup>

My plan is as follows. In §2.2 I present a semantic/pragmatic alternative based on a principle of economy that takes into account the contradictions generated by scopal structures, and show how this account can handle, apart from the examples already covered by the strong economy principle, many of the data which proved to be problematic for the economy principle. I then discuss (in §2.3) the conceptual advantages of the pragmatic account, and answer some of the worries that might arise in connection with this account.

## 2.2 STRONGER PRAGMATICS: SCOPE ADMISSIBILITY

For reasons that will be later discussed, I call the account advanced in the present chapter the *controversy-based* (CB) account. The CB account makes essential use of the strength or entailments of the scopal readings. In particular, on this view, scalar implicatures affect scope and, more specifically, scope-saliency. According to the CB account, the pragmatic principles regulating the interaction between scalar implicatures and scope are (i) an adequacy condition on admissible scopes, i.e., scopes that can generate, *via* an implicature mechanism, inconsistency or ‘controversy’, and (ii) a saliency condition that assigns salience to scope possibilities depending on the level at which inconsistency appears.<sup>3</sup>

<sup>2</sup> The stronger claim (ii) is very appealing from the standpoint taken in this chapter. More precisely, the view expressed by (ii) may take two forms, one of which is more conservative with respect to mainstream assumptions (including assumptions about economy), whilst the second is more radical. The conservative solution is that (a) scope ambiguities are not constrained by Scope Economy, but by purely pragmatic principles under syntactic (non-economy) constraints. The more radical solution is that (b) scope ambiguities are not dealt with at LF, and, consequently, we don’t need any principle of scope economy in the grammar.

According to (b) we need to disallow covert operations altogether, and deal with scope-properties by semantic means. This comes to maintaining an underspecification theory of scope. The idea seems to be in the minimalist spirit (cf. Reinhart (2006)). The main motivations for such an account are the following. Scope phenomena—and the corresponding covert operations that give birth to scopal flexibility—are very complex and unwieldy, and alternative ways of unifying the scope-related phenomena are therefore particularly welcome.

<sup>3</sup> This account makes use of broadly Gricean reasoning, especially reasoning based on the maxims of quantity (Grice 1967/1989). I shall adopt further pragmatic constraints (beyond the quantity-like principles), more notably a principle along the



The CB view accounts for the possibility of multiple scopal configurations of a given (multiple-operator) linguistic construction through the linguistic construction's capacity for generating inconsistency. This strategy is very effective in generating the predictions of Scope Economy, but it doesn't account for the strong economy predictions. To do that, I appeal to constraints on salience. The CB view further explains the lack of salience of the inverse scope reading, as being mainly due to (i) defaulting to the surface scope, taken together with (ii) the impact of an interfering implicature and contradiction, and (iii) further Gricean principles. The Gricean principles (iii) will have some local significance in the present argumentation. Admittedly, these Gricean principles are best seen placeholders for a more systematic pragmatic theory, but for my purposes it is important that they offer some initial pragmatic motivation for our account (in accord with the second, pragmatic, desideratum).

I think that factors (i) and (ii) have also independent plausibility. Some well-supported processing-accounts show that we process sentences left-to-right, thus advantaging the surface scope reading as (i) would have it (cf. Phillips 1996). Moreover, there are further phenomena where surface scope is favoured. Similarly to our pragmatic account, the principles of economy include a bias towards surface scope in the sense that, most of the time, they impose criteria only on the admissibility of inverse scope. Reinhart (2006) argues that we default to the surface scope when the computation becomes intractable. This is also in the spirit of the claim (i). So I take claim (i) to be a natural assumption, and I shall employ it in the current account. However, it is claim (ii) which is less explored and, at first blush, more problematic. It is this claim that I shall develop and refine in what follows.

I begin with some basic definitions. Take the *implicature class* or *set* of a linguistic construction to be the class of relevant, primary and secondary, scalar implicatures associated with the logically possible scopal readings of that construction. By primary implicature I mean the standard case of scalar implicature, e.g. the implicature from *some* ( $\exists$ ) to *not all* ( $\neg\forall$ ). Secondary implicatures are implicatures of an entailment of the surface/inverse scope reading or of a primary

---

lines of Grice's maxim of manner, or Levinson's M-principle (Grice 1967/1989; Levinson 2000), and processing constraints (cf. Reinhart 2006). The two principles are in complementary distribution, and together cover a great many set of data (cf. Horn 2004; Huang 2004; Levinson 2000).

While this account involves scalar implicatures, it is not purely pragmatic. First, it is plausible that scalar implicatures are triggered either purely semantically or at a level of interface between semantics and pragmatics. Second, I am endorsing the mixed strategy account, which accepts that important syntactic restrictions might be in place. Note also that accepting syntactic restrictions on scope doesn't mean that scope is a syntactic phenomenon; scope may well be based on an interpretive mechanism that interprets certain syntactic configurations in such a way that it gives birth to *purely semantic* scope distinctions, i.e. distinctions that can be drawn only at a semantic level. Thus, accepting syntactic restrictions on scope is in principle compatible with a scope underdetermination account.

implicature. For instance, *Some t-shirts have few holes*, viz.  $\exists F$ , (primarily) implicates  $\neg\forall F$  and the latter in turn implicates  $\exists M$  (which is thus a secondary implicature of the initial logical form,  $\exists F$ ).<sup>4</sup> I am in a position to define the following, communication-oriented principle:

**ADMISSIBLE SCOPE** A linguistic construction is admissible if its implicature class, its ‘in principle’ possible scopal readings and their entailments form an inconsistent set.

For ease of exposition, I shall refer to the implicature class in an *extended* sense, as comprising not only scalar implicatures but also the scopal structures and their entailments.

Admissible Scope is descriptively equivalent to the (syntax/semantics) interface principle, Scope Economy (SE), in that it disallows scopally uninformative (in our terms, inadmissible) constructions from manifesting scope-flexibility. Arguably, if two scopal readings are logically equivalent, they won’t be admissible (see appendix C). Thus, Admissible Scope can be seen as a semantic/pragmatic interpretation of SE. It is crucial that the principle is formulated in terms of scalar implicatures. In order to be able to use scalar implicatures, I need to make a stipulation about the form these implicatures will take. I need to stipulate that, as far as this computation is concerned, the speaker has perfect information about the subject matter of the discourse (in non-numerical cases). In other words, the implicature mechanism works on the assumption that the utterer is omniscient.<sup>5</sup>

We get additional restrictions on scope by taking into account its salience. Surface scope is by default more salient, but the inverse scope becomes more salient as the contradiction can be derived more quickly. The notion of salience (or admissibility) that follows from Scope Admissibility is left at an intuitive level. I’ll refine it after I introduce the relevant examples. Other syntactic or pragmatic restrictions can affect salience as well. However, my main focus here is on semantic/pragmatic restrictions.

### 2.2.1 A pragmatic reinterpretation of the original ‘strong economy’ data

In this section I discuss the examples that were originally proposed in support of strong economy, as well as some of the counterexamples to strong economy identified in the previous chapter. Insofar as the

<sup>4</sup> Note that the primary and secondary implicatures as defined here are different from the notions of primary and secondary implicature given in Sauerland (2004), which essentially involve epistemic operators (see also fn. 5).

<sup>5</sup> The speaker’s omniscience guarantees, for instance, that  $\exists$  implicates  $\neg\forall$  rather than a logical form that makes reference to the epistemic state of the speaker, e.g.  $\neg K\forall$  (which basically means that the speaker is not in a position to know that all ...). I hope to be able to show in future work that this omniscience stipulation becomes unnecessary, once we get into the details of a theory of scalar implicature.

original data in favour of strong economy are concerned, it should be noted that I shall not take the original judgements of acceptability of the scopal readings for granted, but rather I shall qualify them in light of our account. I shall nevertheless cite the original judgements of acceptability (on the righthand side of each example), for the sake of continuity with the previous chapter and in order to explain how my predictions differ from the predictions made by other theorists.

It is worth highlighting that from my own study of linguistic intuitions about scope, these judgements are highly variable, and context dependent. A survey of linguistic intuitions about these sentences—including proper contexts to trigger the scopal readings—is found in appendix. I address the worries regarding the scopal acceptability of these constructions for §2.2.3.<sup>6</sup> (However, I shall make clear which of the judgements are problematic according to my findings.)

I begin with the contrast between the scopal possibilities of quantifier first-, as opposed to negation first-, double-operator sentences consisting of a universal quantifier and a negation. These constructions are repeated here from (8).

37. a) Every student of mine didn't show up on time.  
        $(\neg > \forall), (\forall > \neg)$   
       b) John didn't meet every student of mine on time.  
        $(\neg > \forall), *(\forall > \neg)$

The starred judgement of accessibility in (37b) is not consistent with my account. I shall first explain why, on the pragmatic account, (37b) inverse scope is in fact allowed.

38. John didn't meet every student of mine on time.
- surface scope: John did not meet every student of mine.  
 $(\neg > \forall)$
  - surface scope implicature: John met some student of mine.  
 $(\exists)$
  - inverse scope: John did not meet any student of mine.  
 $(\forall > \neg)$
  - *contradiction* between surface scope implicature and inverse scope. ⊥

To a first approximation, the account of why inverse scope is not allowed runs as follows. The most salient reading, the surface scope one, has an implicature to the effect that John met some student.

<sup>6</sup> Paul Elbourne and Yuri Cath expressed in personal communication the worry that the judgements supporting my proposal are incorrect. However, as I shall argue, the core judgements are correct, and the very few judgements that don't seem to be correct, can be handled by other means.

Given that the inverse scope reading is inconsistent with this implicature, the inverse scope is allowed, since the derivable contradiction makes it interesting, in the sense of the CB account. Thus, there are two important assumptions at play here. Firstly, in neutral circumstances (without contextual information), there is a privileged scope with which we start out. Second, we test the inverse scope. If this produces a contradiction, the inverse scope gains some salience. If not, the inverse scope is not possible. According to the above computation, (37b) does produce a contradiction. Thus, we have shown that this construction satisfies Admissible Scope, since the implicature set is inconsistent.

I shall sometimes use another device in order to represent the implicature mechanism. As shown in figure 1, the computation of Admissible Scope can be represented using a ‘rectangle of oppositions’. On the top (horizontal) layer, one finds the surface scope logical form (SS), and its implicatures and entailments (SSIs), if any. On the bottom layer, I represent the inverse scope logical form (IS) and its implicatures and entailments (ISIs), if any. A line connecting one of the nodes in the two layers marks inconsistency between the logical forms occupying these nodes, if such an inconsistency is indeed found. Thus, the rectangle of oppositions in figure 1, shows that the surface scope  $\forall \neg$  is inconsistent with the inverse scope implicature  $\exists$ .

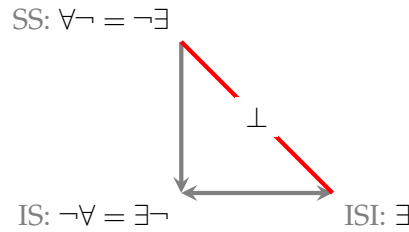


Figure 1.: Contradiction between the surface scope and the inverse scope implicature of a construction consisting of the universal and negation operators.

I turn next to the scopal flexibility of (37a), repeated here as (39).

39. Every student of mine didn't show up on time.

- surface scope: no student showed up.  $(\forall > \neg)$
- surface scope implicature: *none* (i.e. none of interest for our purposes)
- inverse scope: not every student showed up  $(\neg > \forall)$
- *no contradiction yet*
- inverse scope implicature: some student showed up.  $(\exists)$
- *contradiction* between inverse scope implicature and surface scope  $\perp$

A contradiction is derived, since the implicature set of (37a) is inconsistent. As with the previous example, in line with Admissible Scope, in both cases inverse scope *is* possible (on the right occasion or using the right intonation), although it may be salient to various extents, given other pragmatic factors. This is compatible with the weaker economy principle, Scope Economy. I do depart from the strong economy account, as I don't find the inverse scope of (37b) impossible.<sup>7</sup>

However, the case is more complicated. It should be mentioned that the maxim of manner (or a similar pragmatic principle) might play a decisive role in determining the salient scopal reading. The maxim of manner can be formulated as follows. If we find a clearer and less convoluted alternative way to express the same thing, say, proposition *p*, the less clear and more convoluted form of expression will be taken to express something different from *p*, although, in principle, it could have been interpreted as conveying the less salient meaning *p* (Grice 1967/1989; Levinson 2000). In the present case, the same proposition can be expressed in a marked way using the  $\forall\neg$  phrasing (*Every student didn't ...*) and in a less marked way using the  $\neg\exists$  phrasing (*No student did ...*), so, according to the maxim of manner, the latter should be preferred. The former involves two functional expressions (*every ... not ...*) where the latter utilises only one (*no ...*). Consequently, this is a factor that can contribute to a less salient surface scope, and may affect the outcome of the above mechanism.

So, it is to be expected that CB-salience (or admissibility) is not the whole story about scopal salience. The salience of scopal readings is a more complex pragmatic affair. I contend that the CB mechanism interacts with further pragmatic factors in order to determine scopal salience. Regarding the examples just discussed, it is crucial that the two scopal readings are available, and this can be explained by Scope Admissibility.<sup>8</sup>

Let us look at double operator sentences consisting of an existential quantifier and a negation. The relevant construction is (9), repeated here as (40).

40. A/one student of mine didn't show up on time.  
 ??( $\neg > \exists$ ), ( $\exists > \neg$ )

The consistency test for the inverse scope reading will run very similarly to the tests above (since  $\forall\neg \equiv \neg\exists$ ):

- <sup>7</sup> I also depart from the acceptability judgements expressed in Beghelli and Stowell (1997), but it should be noted that these authors expressly disregarded intonation. Since I assume a broader notion of scope—whereby e.g. intonation uncovers scope—this is not a strong difference. As I shall explain, this analysis is a consequence of relaxing the definition of scope.
- <sup>8</sup> More speculatively, I would further claim that the manner implicature can be removed by simply stressing the negation in the surface scope reading. If we do so, the surface scope becomes the salient scopal reading.

41. A/one student of mine didn't show up on time.

- surface scope: there is a student who didn't show up  
( $\exists > \neg$ )
- surface scope implicature: not all students didn't show up,  
i.e. some students did show up ( $\exists$ )
- inverse scope: no student showed up ( $\neg > \exists$ )
- *contradiction* between surface scope implicature and inverse  
scope.  $\perp$

The resulting inconsistency determines the possibility of the inverse scope reading of (40). So, both scopes are admissible. As usual, there will be some parsing-related pressure to favour the surface scope. Are there any other (independent) reasons to prefer one of the scopal readings? This time our prediction based on the implicature mechanism is compatible with the maxim of manner, because the surface scope reading is not marked compared to other ways of expressing the same proposition. If no reason for favouring the less salient (in our case, inverse scope) reading is given, we fix on the salient (in our case, surface scope) reading, and give priority to its implicatures. But, once more, *both* scopal readings are admissible as far as the CB account is concerned.

I should pause to say that this prediction is incorrect. Most native speakers of English find the inverse scope of (40) extremely bad. I discuss the significance of this fact in §2.2.3.

Let us now look at a set of quantificational sentences emphasising the impact of downward entailing operators other than negation. As usual, we consider sentences that were assumed to support the strong economy principle. The example (10) above is repeated here as (42).

42. a) Many windows are always open in this building.  
(many  $> \forall$ ), ( $\forall > \text{many}$ )
- b) Few windows are always open in this building.  
(few  $> \forall$ ),  $*(\forall > \text{few})$

Here the judgements expressed on the right-hand side are not mine, but are rather the judgements as predicted by the strong economy account. My predictions are importantly different. By computing the implicature-consistency test for these constructions, we obtain admissible scopes for both.<sup>9</sup>

<sup>9</sup> The relevant scope-saliency computations of (42a) and (42b), repeated here as (43) and (44), are presented below in a more piece-meal fashion.

43. Many windows are always open in this building.

- surface scope: many windows are always open      many  $> \text{always}$
- surface scope implicature: not all windows are always open       $\neg > \forall > \text{always}$

As the rectangles of oppositions in figure 2 show, the surface scope interpretations and the inverse scope implicatures of both constructions are inconsistent. Considering first (43), the inverse scope says that at all the times many windows are open, which is different, and in effect *weaker*, than saying that there is a low number of windows (viz. few windows) open at all times. Therefore, the former implicates the negation of the latter, which, in turn, is inconsistent with the surface scope reading (to the effect that a low number of windows are open at all times). Taking (44), we get an inverse scope reading that amounts to saying that at all times a large number of windows (viz. many windows) are open. Evidently, this is different, and indeed weaker, than saying that a large number of windows are open at all times. In consequence, the latter, stronger reading should be removed, and this gives rise to the inverse scope implicature. But the inverse scope implicature is the negation of the surface scope reading. Thus, we get a contradiction in the implicature set.

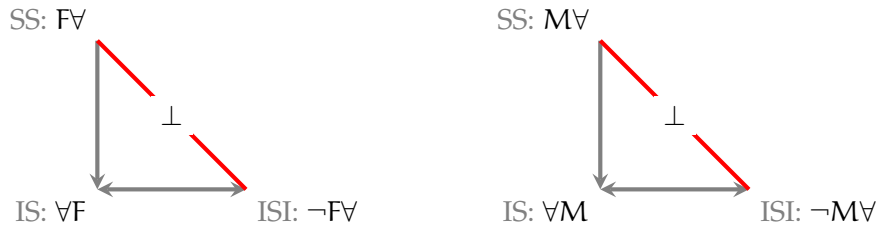


Figure 2.: Contradictions between surface scope and inverse scope implicature of constructions consisting respectively of (i) *few* and universal operators, and (ii) *many* and universal operators.

So, on the CB view, both scopal readings are admissible, and equally salient. If we consider that parsing constraints affect scopal saliency, the inverse scope reading for the  $FV$  configuration should be overall less salient, unless other pragmatic factors intervene. Hence, in contrast to the strong economy view, on my view there is symmetry between the *many*-quantifiers in (42a) and the *few*-quantifiers in sub-

- 
- inverse scope: always (at all the times), many windows are open always > many
  - inverse scope implicature: not many are always open      not many > always
  - *contradiction*: between surface scope and and inverse scope implicature  
⊥

44. Few windows are always open in this building.

- surface scope: there are few windows which are always open.    few > always
- surface scope implicature: irrelevant for the computation
- inverse scope: always there are few windows open.      always > few
- inverse scope implicature: it's not the case that few are always open.  
¬ > few > ∀
- *contradiction*: between surface scope and inverse scope implicature.    ⊥



ject position in (42b). Now, I contend that this is not a bad prediction. To my ear, both scopal readings are possible for (42b): it can be interpreted as saying that there is a set of windows whose number is low and which are open permanently (surface scope), but also as stating that at each time possibly different sets of windows whose number is low are open (inverse scope).

I have sketched how we can account for the scopal salience properties of several standard doubly quantified constructions within the CB view. There are many other standard constructions that will receive a similar treatment (see appendix D for the computation of the other standard cases). In what follows, I focus on several examples that pose more serious problems for my view.

Several examples due to Beghelli and Stowell (1997), namely (43)–(44), (see also fn. 6) exhibit a contrast in the scopal possibilities of indefinites and bare numerals.

43. *Indefinites or bare numerals under negation.*

- a) The students didn't read some books.
- b) The students didn't read two books.
  - surface scope: the students did not read 2 books  
 $\neg > \exists_2$
  - surface scope implicature: at most one book was read  
 $1 \vee 0$
  - inverse scope: two books were not read  $\exists_2 > \neg$
  - inverse scope implicature:  $\exists x$  unread book  $x$
  - *no contradiction*, since all the assumptions are compatible

44. *QPs always take scope above negation in the absence of marked intonation.*

- a) Some students didn't read this book.
- b) Two students didn't read this book.
  - surface scope: 2 students didn't read this book  $\exists_2 > \neg$
  - surface scope implicature:  $\exists x$  student who read this book  $x$
  - inverse scope: it's not the case that two students read this book  $\neg > \exists_2$
  - inverse scope implicature: at most one student read this book  $1 \vee 0$
  - *no contradiction*

Let us focus here on the more interesting case of bare numerals. What is distinctive of these cases is that in the absence of concrete



information about the total number of books, it is impossible to reach a contradiction. Thus, given that I assume Scope Admissibility, it might appear that on my account these constructions are scopally unambiguous. However, these sentences are clearly ambiguous (at least if we take intonation into account). To find a solution to this problem, consider the general case in which there are  $n$  books assigned to the students and focus on the distributive reading of the  $n$  operator. In (43b), the surface scope reading asserts that the students read fewer than two books (0-1 books) whilst the inverse scope reading asserts that the students read  $n - 2$  books. It is easy to see how we could get a contradiction if we fill in contextual information. There are many possible values for  $n$  that would generate inconsistency. Let us assume that there is a total of 5 books that the students had to read (so,  $n = 5$ ). The surface scope reading remains the same (fewer than 2 books were read), and the inverse scope reading now asserts that the students read 3 books each. It is clear that these two propositions are incompatible.

Simply positing that such constructions are scopally ambiguous in virtue of arriving at a contradiction runs the risk of over-intellectualising the pragmatic capacities of the competent speaker. To be sure, it is not necessary that the competent speaker make such inferences, even if she is in the possession of precise numerical information. My point is that it is nevertheless marginally possible for the competent speaker to make such inferences, and her doing so makes salient certain scope possibilities (those predicted by our mechanism). In case no relevant information is available, the scope salience of the numerical construction remains indeterminate.

A sceptic might insist that I put the cart before the horse, since I am positing that the inverse scope of a construction is possible in virtue of its inconsistent implicature set. However, the sceptical thought goes, it is perfectly possible to see the inverse scope reading even without being able to do the computation that derives a contradiction. Although I agree that the thought is unintuitive, my answer is that despite having a strong intuition that scope flexibility is possible in the absence of contradiction, scope flexibility is possible *in virtue of a potential inconsistency* in the implicature set. At the moment, I leave unanalysed how exactly the generation of a contradiction makes available scope-flexibility, and the relation between scope and inconsistency should be taken as a descriptive correlation between the two grammatical properties. I return to this issue in §2.3.

Beghelli and Stowell (1997) pointed out that there is a contrast between the scopal possibilities of (43)-(44). Only the latter needs marked intonation in order to make available the inverse scope. This seems to contrast with the controversy-based take on scope. Nevertheless, I can grant that the syntactic account of Beghelli and Stowell (*ibid.*) is on the right track, and hence that the syntax of the above

constructions will have different effects on the availability of the scopal readings. The only proviso I need to add is that the different effects are still to be evaluated as determining the saliency of pragmatic scope. My notion of pragmatic scope is distinct from the syntactic notion (see also fn. 7). As I suggested, the syntactic restrictions underlying these constructions are just part of the constraints on pragmatic scope, and can be overridden for semantic/pragmatic effects.

In sum, according to our semantic/pragmatic account there are multiple factors that may be involved in establishing scope possibilities. The defeasible bias towards surface scope is implemented through the implicature mechanism: the less immediate the inconsistency is from a derivational point of view, the more salient the surface scope becomes. From our controversy-based perspective, the GSEC (or strong economy account) makes, in part, the right predictions because it tracks the restrictions imposed by the consistency test coupled with further pragmatic restrictions (e.g. Gricean manner-implicatures). But since the CB account consists of non-categorical principles, principles whose effects depend on the linguistic context, the predictions made by GSEC are bound to differ from the predictions of the CB account. Indeed, I argued that the strong economy predictions fall short in several cases. I now turn to discuss the examples for which strong economy failed.

## 2.2.2 Extending the pragmatic account to the previously problematic data

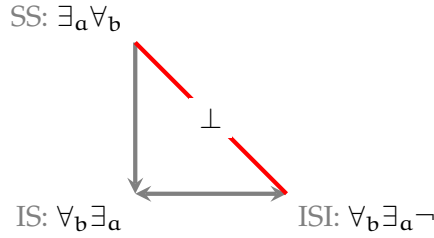
### 2.2.2.1 *More quantifiers*

The most basic example that I discuss is the case of universally and existentially quantified constructions such as (45).

45. Everyone loves someone.

The inverse scope reading of this construction is admissible (viz. CB-salient) since we can derive a contradiction from its implicature set. This prediction is borne out, but strong economy needs special provisions in order to explain away such cases. (The inverse scope is clearly stronger than the surface scope reading, and, as such, it should be ruled out by strong economy.) The implicature mechanism on which the pragmatic account relies is sketched in the rectangle of oppositions in figure 3.

The surface scope logical form receives an interpretation to the effect that some person is such that s/he is loved by everyone. This is stronger than saying that everyone loves some, possibly different, person—the inverse scope reading. Therefore, the inverse scope reading implicates the negation of the surface scope reading, and given that this implicature will be in the implicature set along with the surface scope reading, the implicature set will generate a contradiction.



**Figure 3.:** Implicature computation results in contradiction between the surface scope and the inverse scope implicature of a construction consisting of a universal and an existential.

The contradiction is relatively easy to get compared to other cases, and thus we expect the inverse scope to be moderately salient.

Other scopal readings may be unclear due to the lack of a proper context that would generate the inconsistency required by Admissible Scope. As we have seen, some cases will appear to remain scopally indeterminate (see e.g. (43)-(44)). In this connection, let us look at (46).

46. Al did not attend more than two meetings. ( $\neg > \text{more than two}$ ),  
(more than two  $> \neg$ )

My predictions are straightforward in such cases. In the absence of any specific context, there is no resulting contradiction, so the surface scope reading will be more salient. I treat the other examples involving *at least three*, *more than two* in similar ways.

However, as I hinted above, the fact that no contradiction ensues when contextual information is absent does not mean that contradiction cannot be in principle obtained. It is easy to construct contexts in which the information provided by the possible scopal readings (and their implicatures or entailments) is inconsistent. For instance, consider (46) in a context in which there are seven meetings in total. The computation of the implicature mechanism will run as follows. When negation takes scope over the numerical phrase *more than two* ( $\neg > \exists_{>2}$ ), we get a reading according to which Al attended at most 2 meetings, i.e. he attended 0-2 meetings out of 7. Under the inverse scope interpretation ( $\exists_{>2} > \neg$ ), there are at least 3 meetings Al did not attend, i.e. he attended 0-4 meetings out of 7. A contradiction follows from the implications of the surface scope and inverse scope readings. This computation is sketched in figure 4. (In this particular case, the leftmost SSI and the ISI represent implications of the surface scope and inverse scope respectively, rather than implicatures.)

I want to suggest that the easiness (or difficulty) of getting at such contexts has a systematic effect on the implicature mechanism's capacity to 'see' the inconsistency that can be determined by the numerical cases, and thus on the salience of the scopal flexibility of the numerical constructions. Admittedly, in the numerical case (46), the

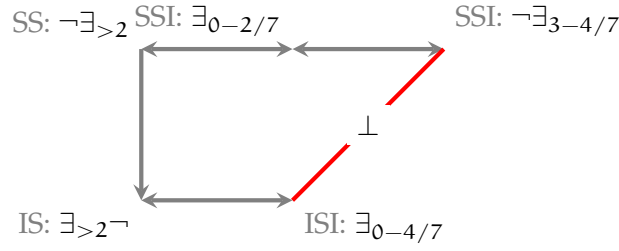


Figure 4.: Contradiction in constructions with negation and *more than*-operators under complete information

difficulty of getting the inverse scope of (46) might itself explain the lack of salience of the inverse scope reading, without needing to invoke the implicature computation posited by the CB account. (This notion of salience will be distinct from CB-salience, since it does not have to do with how many steps in the implicature computation are needed to obtain a contradiction.) However, the CB account may trade on the difficulty inherent to forming the inverse scope as well, because if the inverse scope is difficult to get, the implicature set will be difficult to form, and, consequently, it will be hard to compute the inconsistency test. But no matter how hard it is to get an inconsistency, the inconsistency can obviously be obtained, and thus it still is the case that the CB account predicts both scopes of (46) to be admissible and salient.

I remarked earlier that GSEC assumes that *few* under inverse scope works with empty restrictions. This was found to be problematic, since, in general, *few* seems to imply non-empty domains (or existence). More precisely, it implies non-empty restrictors. How do I handle the quantificational determiner *few*? As before, I focus on the distributive readings of (47) below—rather than the collective ones according to which the apostles owned collectively the things in question—and apply the implicature mechanism.

47. Every apostle had few things.

- surface scope: every apostle had few things ( $\forall > \text{few}$ )
- surface scope implicature: there are no things that every apostle had ( $\neg \exists > \forall$ )
- inverse scope: there are few things that every apostle had ( $\text{few} > \forall$ )
- inverse scope implicature: there are things that every apostle had ( $\exists > \forall$ )
- *contradiction* between surface scope implicature and inverse scope implicature  $\perp$

The result is that the inverse scope is available, but not for the reasons advanced by strong economy (which has it that weaker scopes

are always available). Since the quantifier presupposes non-empty domains, the inverse scope is actually stronger than the surface scope.<sup>10</sup> By the implicature mechanism, the inverse scope is admissible and moderately salient, since it is relatively easy to get a contradiction.

Before going on, it is important to note that the CB account shares a common wrong prediction with the strong economy account. The wrong prediction involves the collective readings discussed in the previous chapter—the example (35). Thus, the sentence *Every girl read fewer than three books* cannot be true on an occasion in which each girl read two books, and thus the girls read four books collectively. Yet, if the inverse scope collective reading were available, the sentence should have a true reading.

#### 2.2.2.2 Modals and comparatives revisited

We turn now to the modal constructions (28)-(31), which, I claimed, pose problems to the strong economy account. For the purposes of this discussion, I shall disregard the effect of tense on scope, and assume that, albeit important, the effect of tense on (the saliency of) scope can be overridden by other factors that interact with scope, especially by the consistency checking mechanism posited here.

48. a) The/some cakes you cooked could have been fewer.  
(e.g. *speaking about the chocolate ones*)  
b) Some cakes you have cooked should have been fewer.  
(e.g. *chocolate cakes are unhealthy*)  
c) You could not have prepared fewer cakes than you did.  
d) You should not have prepared fewer cakes than you did.

The constructions (48a)-(48d) all have inverse scope readings stronger than the surface scope one. The first two constructions are a bit awkward, but I focus on their scopal readings. The latter two are completely acceptable, and will serve us very well in making the same point.

49. Some cakes you have cooked should have been fewer. (= (48a))  
a) surface scope:  $(\text{some cakes})_a \sqcap |\text{possible cakes}| < |(\text{some cakes})_a|$   
(the number of possible cakes at some possible world  $w_i$  is less than the number of actual cakes)

<sup>10</sup> How do we get the surface scope implicature? The surface form of (47) says that every apostle had few, possibly different, things. Consequently, what is implicated is that the speaker is in no position to assert that the apostles owned some of these things (which indeed would be few, since their set is the intersection of the different sets of few things owned by each apostle). Supposing that the speaker has the relevant knowledge, the implicature is that no things are owned by every apostle.

- b) surface scope implicature:  $\neg(\text{all cakes})_a \sqcap |\text{possible cakes}| < |(\text{all cakes})_a|$
- c) inverse scope:  $\sqcap |\text{some cakes}| < |(\text{some cakes})| \quad \perp$   
(the number of cakes at some possible world is less than itself.)
- d) *contradiction* in the implicature set due to the inconsistent inverse scope

Sentence (48b) receives the same treatment as (48a). Its inverse scope is necessarily false (a number of cakes cannot be less than itself), and brings about a contradiction. This contradiction is obtained very ‘quickly’, and we thus expect the inverse scope to be more than moderately salient, albeit not salient for normal conversational purposes. I can thus make more precise the saliency claims made so far. Saliency in my terms depends on how quickly we can derive a contradiction.<sup>11</sup> Some constructions, such as the one just reviewed, allow a very quick derivation of a contradiction in the implicature class. Some other constructions determine a contradiction more slowly. Most of the cases discussed so far are in this latter category. And yet other cases do not produce contradictions at all. These are precisely the cases that do not have truth-conditionally different inverse scopes, and are disallowed by every existing principle of economy, e.g. *Every tune was heard by every guest*. Thus, all other things being equal, a contradiction obtained at the level of surface/inverse scope will render a more salient scopal flexibility than one obtained as a result of the incompatibility of a scopal reading and one of the implicatures in the implicature class.

Similar treatments will be given to the other modal constructions, except that the inconsistency will be produced in other parts of the implicature class, as shown in the following derivations and in figure 5. (The figure for (50b) will be similar to the one for (50a).)

- 50. a) You could have prepared fewer cakes than you did.
  - surface scope: at some world, you prepare fewer cakes than you do ( $\Diamond(|\text{few cakes}| < |\text{few cakes}|)$ ). This is a *contradiction* and hence necessarily false.
- b) You must have prepared fewer cakes than you did.
  - surface scope: as above, an *contradiction* is derived from the surface scope.

The quickness of the contradiction is pictured more intuitively in figure 5, where the usual rectangle of oppositions has been reduced to a simple line.

<sup>11</sup> In appendix C, I give a semantic interpretation of the ‘quickness’ of deriving a contradiction in terms of the simplicity of a disjoint partitioning in the logical space induced by the implicature set.

$$\begin{array}{c}
 \text{SS: } \Diamond(c < c) = \perp \\
 \downarrow \text{ (red arrow) } \\
 \perp \\
 \downarrow \text{ (red arrow) } \\
 \text{IS: } c_a \Diamond(c_a < c)
 \end{array}$$

Figure 5.: Inconsistent surface scopes for constructions with modals and comparatives

The surface scopes of (50a)-(50b) are absurd or necessarily false. According to the above reasoning both scopes should be salient, but there is a twist. The scope that is essential to the derivation of a contradiction has some prominence over the one which doesn't. Now, normally, both scopes (or their implicatures) associated with a given sentence are necessary in order to produce a contradiction, and this makes the scopes equally salient, since they are both essential for the derivation of the contradiction. But the examples just discussed are special in producing inconsistencies that are essentially tied to only one of the scopal readings. This distinction is potentially relevant for explaining why although both scopes are admissible, the scopes that are inherently inconsistent have a special saliency status. That is, I propose that when the inconsistency in the implicature set depends essentially on one of the scopal readings, that scopal reading will be more CB-salient than the other. But what does it mean to say that an inconsistent scopal reading is CB-salient?

I find myself in the predicament I alluded to above: the implicature mechanism predicts that inconsistent scopes are salient, but on an intuitive notion of salience—that is, assuming that the salient reading is supposed to convey some useful information—only the weaker (non-contradictory) scope will be salient, since only it will be normally noticeable in conversation. So there is a clash between the controversy-based perspective on salience, and a conversational or pragmatic perspective on that notion. Thus, to a first approximation, we could say that a quantity-like maxim takes precedence over the implicature mechanism and rules out interpretations that are either too strong or too weak (i.e. are either contradictory or trivial).<sup>12</sup> I also appeal to a piece of intuitive phenomenological data: the contradictions are just striking and once one gets an instance of inconsistent scope (or more generally disambiguation) of a sentence, it is easy to see the same pattern occurring in other sentences as well. I shall return to this matter in §2.3.

<sup>12</sup> That being said, there may be independent syntactic or semantic reasons (e.g. pertaining to tense) for which the inverse scope reading is not available. For now, it is important that we have a unitary constraint on the treatment of both the modal and non-modal examples.



## 2.2.2.3 ACD again

ACD data have been shown to pose problems to strong economy, as they can produce stronger scopes. Consider (22)-(26), repeated here for convenience.<sup>13</sup> The fact that ACD cases involve covert movement in order to avoid infinite regress does not seem to have any significant effect on the way the implicature mechanism functions. So we expect the same scopal possibilities as in non-elided cases involving the same pairs of operators (e.g. negation and universal QP, as in (51a)).

51. a) Mary didn't invite everyone that I did  $\Delta$ . ( $\forall > \neg$ ), ( $\neg > \forall$ )
- surface scope: not everyone that I invited was invited by Mary ( $\neg > \forall$ )
  - surface scope implicature:  $\exists x$  Mary and I invited  $x$
  - inverse scope: Mary didn't invited anyone that I invited ( $\forall > \neg$ )
  - *contradiction* between surface scope implicature and inverse scope  $\perp$
- b) John didn't agree to visit every city Mary did  $\Delta$ .  
( $\forall > \neg$ ), ( $\neg > \forall$ )
- c) Beck didn't read a report on every suspect Kollberg did.  
( $\forall > \neg$ ), ( $\neg > \forall$ )
52. a) Kollberg didn't want every book that Mary wrote.  
*de dicto, de re*
- surface scope: not every book that Mary wrote was such that I wanted it ( $\neg > \forall$ )
  - surface scope implicature: there were some books that Mary wrote and I wanted
  - inverse scope: I didn't want any book that Mary wrote ( $\forall > \neg$ )
  - *contradiction* between surface scope implicature and inverse scope  $\perp$
- b) Kollberg didn't want every book that Mary did  $\Delta$ .  
only *de re*<sup>14</sup>

The surface scope readings are more salient, thanks to the results of the inconsistency tests and the markedness of the inverse scope reading for expressing the proposition it expresses (cf. using the more natural *anyone* or *any* instead of *everyone* or *every* to express the inverse scope reading). However, under a specific intonation, we can

13 Perhaps an easier way to get ambiguities in (51a)-(51c) is by replacing the universal quantifiers with existential ones (and in particular with *someone*, *some*).

14 I should remark that this 'only *de re*' judgement is not predicted by the CB account.



get the inverse scope readings as well. The scopal readings are obtained in these examples either by pulling only the quantifier phrases out of their place (inverse scope reading), or by pulling the negation too, landing it before the quantifier phrase (surface scope).<sup>15</sup> As I remarked, if these scopal possibilities really exist (and this seems to me plausible), they are counterexamples to the strong economy account, but not to my pragmatic account. I predict the inverse scopes to be admissible, because the corresponding implicature sets are inconsistent.

### 2.2.3 Empirical issues

I have applied the implicature mechanism to the representative cases, which is enough to give a sense of the explanatory possibilities of the pragmatic account. Further examples and overall information about the scopal readings, entailments and implicatures entering the pragmatic computation is summarised in the table in appendix D. In another appendix (C), I provide the definitions of the main notions of the controversy-based account and prove the principal claims about the admissibility of various types of scopal configurations. In the rest of the section, I want to address some of the empirical worries some readers may have regarding the scopal constructions just discussed.

The empirical domain of the present proposal is too large to allow for a systematic defence in this chapter. However, I tested some of the sentences that seem to set my proposal apart from other extant accounts. Since, moreover, my judgements about these very sentences seemed problematic to some theorists on their first encounter with my analysis, I find it useful to summarise my findings here in order to alleviate the worry that my scopal judgements are incorrect, and thus do not provide support for my account.<sup>16</sup>

To this effect, I gathered data from 30 native speakers of English for sentences (37b), (37a), (40), (42a), (42b), (47), or, in some cases, very close equivalents of such sentences. All the sentences are evaluated by informants in specific contexts (given as one-paragraph vignettes) on a scale from 1-7 according to how good the sentences appear to them. I made it clear that matters of style and grammar learned in school are not important for the evaluation. Rather, what's important is whether there is an interpretation of the sentences which is compatible with the context and, moreover, whether that interpretation is

<sup>15</sup> One final note about the sentences in (52). Pesetsky's predictions for the elided sentences (52) make appeal to *de re* readings. I took these predictions to imply that a *de re* reading of the relevant QP will be given by that QP taking scope not only above the attitude verb *want* but also above the negation. This is reasonable, since the most plausible landing site for the QP is Spec-CP (Spec TP is already taken).

<sup>16</sup> Many thanks to Paul Elbourne and Yuri Cath for pressing me on this issue, and for the suggestion that a linguistic survey is needed to support my thesis.

informative enough and acceptable in regular conversation (further details in appendix).

- (37b): nearly 30% of the informants find the inverse scope of this construction good in context, i.e. informants give it grades from 5-7, and 50% find it bad, i.e. informants give it grades from 1-3. When 'all' is used instead of 'every' in (37b), 50% find it good, and only about 15% find it bad. I contend that (37b) is not problematic, given the high percentage of people who find the inverse scope acceptable.
- (37a) more than 50% of the informants find the inverse scope of this sentence bad, and 40% found it good. Thus, (37a) is not problematic for our account.
- (40): more than 70% of the informants find the sentence bad, and an insignificant percentage find it good. Thus, (40) is problematic for our account.
- (42a): more than 50% of the informants find the construction bad under the inverse scope reading, and more than 30% find it good. Since there is a high percentage of informants that get the inverse scope reading, I consider that the present account is not problematic in view of (42a).
- (42b): more than 75% of the informants find the construction good under the inverse scope reading, and 13% find this bad. From our standpoint, this is as expected.
- (47): while more than 50% find the inverse scope bad, 40% find it good. Substituting 'all' for 'every', the situation is reversed: nearly 50% find it good, and nearly 40% find it bad. Therefore, we have reasons to think that the inverse scope interpretation is available, in accord with other account.

There are many methodological issues that I skip over here, and instead adopt the simplest view of the results. Namely, whenever a reading of the sentence (e.g. the inverse scope reading) is grasped by at least 30% of the informants, I take the reading to be available and consider that the rest of the informants just missed that reading. From this perspective all the constructions but one are compatible with the present account. Furthermore, given that (40) is the only piece of data in my data set that proved to be recalcitrant, I consider it appropriate to hold onto my thesis, with the caveat that *one*-determiner phrases should be accounted for by appeal to further restrictions. As I shall suggest, these constructions are not the only ones for which we need tools beyond my semantic/pragmatic mechanism. But this is not a problem at this point of development, since the account applies well to many other constructions.

## 2.3 THE CONTROVERSY-BASED ACCOUNT

Scope Admissibility is the main principle that governs scope saliency. Notably, this principle is an economy principle, since it assigns a grammatical property (saliency) according to the result of a computation involving a set of logical forms. In this sense, Scope Admissibility is a global principle of economy, although its globality is very restricted, and compared to pragmatic principles it appears to be fairly local.

I should stress that the controversy-based account is here presented as a *theoretical possibility* rather than an empirical claim. This account can be viewed as a reinterpretation of the standard interface economy principles in other theoretical terms. In this section, I shall try to say more about the theoretical motivation of the controversy-based account, and what distinguishes it from other principles.

## 2.3.1 The roles of contradiction

Contradictions play a central role in stating my pragmatic economy account. But why focus on contradictions? Here, I shall introduce some suggestive examples, as well as a related theoretical framework, which suggest that contradictions may have an important role in grammar.

When Russell (1905) introduced his celebrated yacht example—*I thought your yacht was larger than it is*—he explicitly connected the inverse scope reading—according to which the statement asserts the absurdity that the yacht is larger than itself—with its contradictory interpretation. My purpose has been to exploit this fact. I have attempted to connect inconsistency and scope in a systematic manner. Inconsistency has been recently invoked in the linguistics literature in order to rule out possible LFs (see Chierchia 2013; Gajewski 2002 and my discussion in the introduction). Here, by contrast, I invoke inconsistency in order to rule *in* some pragmatically available—that is, salient—scopal interpretations.<sup>17</sup>

Let me elaborate on these points. I start with the observation that contradictions help the detection of structural ambiguities (including scopal ambiguities).

<sup>17</sup> In the philosophical literature, Brandom (2008) advances a more ambitious semantic account in which contradiction plays a central role. His account is based on *incompatibility*, which is a specific notion of contradiction. Brandom puts incompatibility at the basis of his semantics, in the sense that the semantic values of sentences are defined by way of this notion. Roughly speaking, in his holistic account, the semantic value of a sentence is the set consisting of all the propositions expressed by sentences incompatible with the sentence whose semantic value is being defined. The role of contradiction in my account is more minimal, since I make only the scopal properties of a sentence dependent on whether it can generate a contradiction and on how this contradiction is generated.

53. *Contradictions determine relatively more salient disambiguations of structural ambiguities*

- a) i. He wishes he was taller than you.  
ii. He wish he was taller than himself.
- b) i. Oedipus thought that Jocasta was not his mother.<sup>18</sup>  
ii. Oedipus thought that his mother was not his mother.
- c) i. It is raining and it is not snowing.  
ii. It is raining and it is not raining.

The basic intuition on which I build is that in each pair of constructions in (53a)-(53c), the construction that can generate a contradiction (i.e., the first construction in each pair) is more clearly ambiguous than the construction that does not generate a contradiction (i.e., the second construction in each pair). Thus, (53(a)ii) may be interpreted in a contradictory way, as someone's wish that his height *h* be greater than *h*. But the same construction can be also interpreted as expressing his wish to be taller than he is. Further, the construction in (53(b)ii) may be used to attribute a contradictory thought to the effect that Oedipus' mother is not his mother, but also the coherent thought that a particular person (Jocasta) is not his mother. The construction in (53(b)ii) can also be interpreted as either asserting that at particular point in time it is both raining or not raining, or as asserting the more reasonable thought that at some point in time/space it's raining, and that at another point it is not raining. All these constructions make it manifest that they can be interpreted in at least two ways, and they make this semantic/pragmatic property (viz. structural ambiguity) manifest more clearly than the similarly structured sentences in each pair. The type of ambiguity with which I am concerned is scopal ambiguity, but the correlation that I am positing holds more generally about any type of structural ambiguity.

Examples such as (53(a)ii), (53(b)ii), and (53(c)ii) are common currency in the linguistic and philosophical literature, and are deployed to make (and test) various points about the meanings of the constituent expressions, as well as about the psychological attitudes of the utterers (and hearers) of these constructions. But note that all these theoretical remarks have something in common. They (implicitly or explicitly) rely on the structural ambiguity of the examples (53(a)ii), (53(b)ii), and (53(c)ii). In contrast, they do *not* rely (or, at least, they rely less often) on the ambiguity of constructions such as (53(a)i), (53(b)i), and (53(c)i). The former type of example may be taken as a heuristic basis for the claim that the latter type of example is also structurally ambiguous. My key point is that there is a good reason, originating in an essential property of language, for this theoretical methodology. The point is that contradictions make salient

<sup>18</sup> Examples (53(b)i)-(53(b)ii) are from Reinhart (1983a).

the different readings of linguistic constructions, including both the contradictory and the non-contradictory readings.

This point may seem common-sensical. Of course, one might say, if a cooperative hearer finds an utterance to be contradictory, she must look for alternative ways of interpreting the utterance, and thus she will be prone to discovering structural ambiguities. In contrast, the same reasoning goes, there is no incentive for finding ambiguities in utterances that are non-contradictory, but rather contingent. Thus, from the perspective of rational and cooperative communication, it might seem unsurprising that *ceteris paribus* contradictions disclose ambiguities better than contingencies. However, while I agree with these remarks, the correlation that I want to draw between contradiction and structural ambiguity is stronger. My contention—and at the same time my speculation—is that it is *because* a construction can generate a contradiction, rather than due to cooperativeness considerations, that the construction has two (or more) salient readings.

I take a contradictory assertion to be an assertion which cannot be true. So the sentences traditionally known as *contraries*—i.e., those sentences that cannot be true together but can be all false—and *contradictories*—i.e., those sentences that can be neither together true nor false together—are both contradictions, in my terms.

Borrowing a distinction between types of trivial sentences from Chierchia (2013, 49ff), it is worthwhile noting that these contradictions are not strictly *G-trivial*, but are rather part of the larger category of *L-trivial* sentences. *L-trivial* sentences are those that are true/false in any interpretation of the lexical items, by attributing the same denotation to the lexically identical items. That is, *L-trivial* sentences are true/false just in case we interpret the lexical items *uniformly* and keep the meanings of the functional items fixed. *G-trivial* sentences are a subset of the *L-trivial* sentences and are characterised by being true/false irrespective of the (uniform or non-uniform) interpretation of lexical items. In other words, a sentence is *G-trivial* even if we *randomly* (non-uniformly) substitute the lexical items with other lexical items.

Since I am here interested in contradictions, I focus on the two types of triviality that produce falsehood under (uniform and non-uniform) interpretations. This type of *L-triviality* is called *L-contradiction* and corresponds to the broader notion of *G-contradiction* (obtained by giving up uniformity of value assignment or substitution). My claim that *L-contradiction* is correlated with ambiguity (and, in particular, scopal ambiguity) suggests an interesting ramification concerning the role of contradiction in the grammar. *G-contradiction* has the negative role of ruling out logical forms as ungrammatical, whilst *L-contradiction* has a permissive/positive role insofar as it determines which logical forms (e.g. scopal readings) are allowed.

So these are the roles contradictions may have in the grammar. It should be stressed that my point is based on the correlation between contradictions and structural ambiguities, rather than on the precise implementation of such correlation. Although not itself a processing account, the idea trades on a processing remark: the contradiction-potential of an ambiguous structure makes the ambiguity (and thus the possible readings that disambiguate the ambiguous construction) more salient.

### 2.3.2 Pragmatism and Controversy

The sort of principles I have appealed to are sensitive to semantic information, including information that is given contextually. These principles are optional and defeasible. They can freely compete with other principles, thus determining the salient interpretations. So, optionality, competition, and information sensitivity are the criteria that make our approach semantic/pragmatic. I say that the CB account is semantic/pragmatic, rather than pragmatic, because I do not want to prejudge the linguistic nature of scalar implicatures—which are part of the mechanism.<sup>19</sup> I shall call the controversy-based account pragmatic, insofar as the relevant comparison class consists of the interface economy principles, rather than Gricean principles. However, the difference between controversy-based principles and other economy principles should not be inflated.

The CB account is close to what Reinhart (2006) called *interface strategies*. Their underlying principles are competing with each other, and thus are optional rather than obligatory. Interface strategies are also permeable to contextual factors. Still, the present proposal differs from Reinhart's in that, according to my view, the pragmatic principles ultimately concern the salience of semantic/pragmatic structure (scope) rather than syntactic structure, and salience may be affected by pragmatic factors beyond contextual information (e.g. by the Gricean maxim of manner, or a similar principle). Thus, this account can be seen as a semantic/pragmatic reinterpretation of the extant principles of economy. It offers the resources to alleviate some of the problems faced by strong economy, whilst preserving the main insights of the standard principle of economy, and, to a lesser extent, the predictions of strong economy. I made a *prima facie* claim that this account can deal better with many of the problematic cases and thus can throw new light on the nature of linguistic economy.

One important feature of the present account is that it exploits the potential interactions between implicatures (and other implications)

<sup>19</sup> Hence, I remain neutral on whether scalar implicatures are semantic, as argued in Chierchia (2004), or pragmatic, as argued in Sauerland (2004). As I suggested above, I shall likely obtain more constraints on my account once I consider more in detail the linguistic nature of scalar implicature.



of scopal readings and the availability or accessibility of those scope readings. Thus, the key idea is that some implicatures have direct or indirect consequences on scope possibilities, in a similar way that entailments sometimes do.<sup>20</sup> On the CB view, the interactions between implicatures (or other implications) and scope are mediated by contradictions. This is explicit in the way the implicature sets are formed, since these sets contain both the scopal logical form and the entailments and scalar implicatures of these forms. There is yet another important constraint on the way the potential inconsistency of the implicature set affects scopal saliency.

I have implicitly assumed all along an ordering on the implicature sets given by Scope Admissibility, an ordering that I shall call *Gradability*. The basic idea of Gradability is the following. Scope is a processing phenomenon: the more difficult it is to get the inconsistency, the more difficult it is, *ceteris paribus*, to obtain the corresponding scopal reading.<sup>21</sup> Thus, if the contradiction is at the level of the entailments or primary implicatures of an inverse/surface scope reading, then the scope should be readily available. Scope will be less salient if the inconsistency appears only at the level of secondary implicatures. The limiting case is where the inconsistency never appears, and consequently the inverse scopes are never allowed. However, some of these distinctions may be too *fine-grained* to see directly and thus to have a perceivable effect (e.g. distinctions between contradictions obtained from primary implicatures and those obtained from secondary ones), but the extreme cases should be clear.

But what is the rationale for constructing *inconsistent* sets that allow scopal structures? In other words, why are inconsistencies of implicatures and other forms important for scope flexibility and salience? A general pragmatic motivation for Admissible Scope may be that the inconsistency potential of a logical form is an indicator of a real possibility for taking sides in a conversation, debate, or controversy, for deciding who is right (by finding counterexamples), or for eliminating falsehoods (in case there are assumptions that you take to be right). It is a way of establishing the potential positions one may take in a conversation, or, otherwise put, a way to orient oneself in the logical space opened up by the implicature set of a given sentence. The aim of a participant in a conversation is to find disjoint partitions in this logical space—viz. to work out which positions are inconsistent. Thus, the constructions that can create controversy are valued and

<sup>20</sup> It is well known that some inverse scope logical forms are entailments of the surface scope under particular assumptions, and this suggests the possibility of two-way interaction between scope and entailment.

<sup>21</sup> For any scopal structure formed from two linguistic operators  $O_1 O_2$ , we get symmetrical results regarding the two possible scopes. This is because the two scopal readings and their implicatures will form identical sets of propositions, and consequently their consistency status will be the same. See the appendix C for demonstration.

endowed with scope flexibility and salience. Otherwise put, only the scopal readings that can generate fine partitions in the logical space (viz., the common ground of a conversation) are conversationally attractive.

As I pointed out, there is a tension between allowing scopes that can determine ‘controversy’, and the usually assumed pragmatic pressure to remove trivial and contradictory scopal readings (see e.g. the comparatives under intensional operators above). This is a tension between the principles of controversy (Scope Admissibility and Gradability) and a principle of charity or the Gricean norms of cooperative communication. The latter are supposed to apply pressure towards removing assumptions that introduce inconsistency in the system.

There are ways to alleviate this tension. One is to take the tension as a contingent fact about the cognitive system. We can see the tension (e.g. the one produced by the modalised comparative cases) as a limit case of the interaction between the principles of controversy and cooperativeness. That is to say, the two principles work well together, except for cases where one of the scopes is trivial or contradictory. When this happens, charity wins. (Even for those who cherish debates, it is not rewarding to get into debates with persons behaving irrationally.)

Another—for all intents and purposes equivalent—way out is to restate our controversy principles, and in particular Gradability, in order to build into the definition of Gradability the effect of charity or cooperativeness. Then, Gradability need not be interpreted as a linear curve of positive slope, in which salience decreases as the contradiction is derivationally more remote. Rather, we can take Gradability to have something like the shape of a bell curve, where constructions with moderately accessible inconsistencies manifest the most salient flexible scopes (the pick of the curve), and the rest of the cases, which involve the quickest contradictions or no contradictions at all, have less saliency or no saliency at all (the two tails of the curve).

We can see now that the controversy-based account is not just an extravagant restatement of the Gricean principles of informativeness (that govern cooperative communication). Looking at the great majority of the examples surveyed here, one might reason as follows. Of course, if the scopal readings of a given construction are informative, we are bound to get a contradiction out of their entailments and scalar implicatures (see the appendix C for a proof of this claim). Therefore, according to this reasoning, the two accounts are formally equivalent. Nevertheless this reasoning cannot be entirely correct. Whilst it is true that the controversy-based account is equivalent to some Grice-inspired account over a broad range of data, the two accounts are not equivalent over the cases that generate contradictions at the level of the scopal readings, and certainly they don’t have the same rationale.



As we have seen, the accounts are distinct in how they treat, for instance, the ‘modal comparative’ construction *I thought Paul cooked fewer croissants than he did*. This modal comparative sentence can be interpreted as expressing an absurdity to the effect that I thought it possible for a number of croissants—cooked by Paul—to be fewer than itself. This reading is not ‘cooperative’ in the Gricean sense, and something else should be said about what is going on in such cases. One possibility is to explain away such cases: the interpreter is just failing to be cooperative in zeroing in on the absurd scopal reading. But another more interesting possibility is that such cases are underscored by the controversy-based principle, according to which getting contradictions has in general a good value and thus should be encouraged. On the face of it, an interpretation geared towards inconsistency is very different from one geared towards cooperativeness.

Thus the semantic/pragmatic role of contradictions should be separated from cooperativeness. Contradictions are detectable even if their utility in communication does not rely on cooperativeness, which suggests that their semantic/pragmatic role is different from that of maximising the rationality and mutual-understanding of the relevant parties in a communicational exchange. Their role may be ‘spectator’-oriented rather than speaker- or audience-oriented (though both the speaker and the hearer can play the role of spectator to their own utterances). By spectator I mean here the rational agent who weighs the possible interpretations and implications of a certain utterance, and, in the case of controversy or debate, thinks about possible ways of construing the logical space generated by the utterance in favour of the speaker or in favour of the hearer.

Contradictions are particularly relevant in case of controversy and debate, since (i) they draw a line between the different opposing positions to be taken as a result of interpreting a given utterance, and (ii) they can be used to attack, ridicule, and confound the opponent. Of course, trying to score points by minimising the rationality of a person cannot be effective in the case of grammatical inferences (since it’s petty, narrow-minded, and naive to insist on contradictory interpretations when grammar makes available consistent interpretations), but can be seen as a reflection in the grammar of a more general, rhetoric practice.<sup>22</sup>

Several further remarks concerning salience are in order. I speculated that it is in view of finding contradictions that competent speakers can distinguish between the saliency of scopal readings. As I

22 This proposal is related to the view that logical deduction developed as a form of dialogical reasoning between opponents—see e.g. Dutilh Novaes (2013)—since the role of contradictions fits very well within such a story. However, here I do not purport to argue that the controversy-based account and the attendant notion of contradiction tell us something about how the notion of scope is learned/discovered by the competent speakers.

pointed out earlier, a contradiction in the implicature set can be generated either by putting together two logical forms which are inconsistent or by an inherently inconsistent logical form. In the former case, when two logical forms are essential for contradiction, both scopal readings (corresponding to the two logical forms) are equally salient according to the CB account. But in the latter case, when a single logical form is essential for contradiction, the scopal reading corresponding to the logical form is more CB-salient.<sup>23</sup> Crucially, we have direct evidence only regarding the latter case. This is because the inconsistent scopal readings have a clear phenomenological character, which makes them noteworthy or salient.<sup>24</sup>

However, CB-salience (or admissibility) is not to be identified with this phenomenological character, since we would like to attribute CB-saliency to scopal readings which lack this character. Moreover, I proposed that the controversy-based account targets CB-salience (as a theory-internal notion) and suggested the present account needs not assume that CB-saliency is all there is to scope. Hence, I left open whether the grammaticality of scopal possibilities depends on CB-salience. This being said, it is a further decision point whether we should entirely do away with an additional grammatical notion of scopal possibility, and posit that CB-saliency is the *unique* relevant grammatical property of scope. For reasons of simplicity, I am inclined to reduce scopal possibilities to CB-saliency, but the arguments in this chapter are neutral on this matter.

### 2.3.3 Implementations and Challenges

Scope is standardly treated in the syntax, or, on an economy-based approach, at the syntax/semantics interface. Here I shifted the perspective, by building more into the pragmatics and processing, unburdening the computations realised by the narrow grammar (viz. syntax). Moreover, although my account is not syntactic, I assume the desirability of a ‘clean’ syntax. I would like to keep the syntactic theory as simple as possible (and computationally efficient), and relegate principles based on competition to semantics/pragmatics in-

23 What do I mean by a scopal reading *corresponding* to a logical form in the implicature set? As sketched in many of the rectangles of opposition, the logical form of a scopal reading may generate entailments or scalar implicatures which are further logical forms associated with a scopal reading. So, when by logical forms *corresponding* to a scopal reading, I mean any of the logical forms associated with a scopal reading: the logical form of the scopal reading itself, or the logical forms of its entailments and implicatures. In terms of the rectangle of opposition, the nodes in the two horizontal layers will host logical forms corresponding to the surface scope reading (the top layer) and inverse scope reading (the bottom layer).

24 The salience of inconsistent scopes can be observed both intra-sententially (when compared to the salience of the alternative scopal reading) or extra-sententially (when compared to the scopal readings of another sentence, namely, readings that correspond structurally to the inconsistent one).

terface. This is because we already know that competition-based principles are standard within pragmatics, and so our pragmatic theories should be in a better position to incorporate the particular economy principles regulating scope (and other phenomena) with minimal theoretical assumptions.

A key role is played by the derivation of inconsistency, which affects, within specified conditions, the interaction between scope, implicatures, and other implications. But there is another characteristic of inconsistency in the interaction between scopes and scalar implicatures that we should be able to integrate in the CB-account. Recall that in the previous chapter, in an attempt to offer a more semantically and pragmatically motivated account of scope in the spirit of strong economy, I offered a minimal account of how the inverse scope can be removed *via* scalar inference. To integrate that minimal account in the present proposal, we need to add a *new layer* to the controversy-based mechanism.

As I have already proposed in this chapter, one layer is devoted to CB-saliency or what I have called *admissibility* in the CB account: saliency due to generating the required inconsistency. The novel layer is what we might call *contextual saliency*, that is, saliency due to the fact that one of the logical forms in the implicature set is independently at issue, for reasons external to the implicature mechanism. If there is (independent) pragmatic reason to make salient one of the scopal readings, the removal of the opposed scopal reading is guaranteed just in case it is stronger. On the minimal account of the previous chapter, the stronger scopal reading is removed because a weaker scopal reading implicates the negation of the stronger one, which, obviously, is inconsistent with the stronger scopal reading. This computation reflects a different role that the implicature mechanism can fulfil, and, at the same time, a different role for contradictions. Their additional role is to make more salient the weaker scopal reading. The account that follows is better motivated from a semantic and pragmatic perspective in the sense that we have independent reasons to think that the scalar implicatures and scopal readings are already present in the interpretation of a sentence.

The second layer, and the corresponding role for contradictions, is a natural extension of the CB account, but, as I pointed out, it may be a restricted part of the mechanism since it requires special circumstances in order for the removal of stronger scopes to take place. In sum, on the current view, contradiction plays a double role. One is to decide scopal possibilities (according to Scope Admissibility). The other is to contribute to the salience of weaker readings, along the lines of the strong economy proposal.

I find the current account, although perhaps not less theoretically adventurous than previous accounts, more elegant, conceptually more natural, and general than the alternatives. From my perspective,

strong economy builds the strengthening specific to scalar implicature—adding the negation of the stronger scalar item, viz. the stronger inverse scope—in the grammar, at the interface between syntax and semantics, as a syntactic constraint, and then has to deal with counterexamples by adding further constraints and restricting the principle’s domain of application. Some of these constraints and restrictions are stipulative, inelegant, or simply appear to lack motivation. Moreover, an interface principle of economy must assume a feedback mechanism that sends information back and forth from the semantics to the syntax. No such inelegant assumptions are needed according to the current hypothesis. First, Scope Admissibility and Gradability do the theoretical job properly and elegantly at the semantic/pragmatic level, thus covering the empirical domain of the original Scope Economy principle. Secondly, in some restricted situations, the second layer of the controversy-based mechanism removes strong scopal readings, thus doing part of the job of strong economy.

A concern about my account is the precise ‘implementation’ of the implicature mechanism. I cannot offer a satisfactory solution to this problem here, but I shall at least introduce two potential strategies for implementing the controversy-based pragmatic principles, and respond to some immediate worries that might arise from these options.<sup>25</sup>

I envision the following strategies or implementation possibilities.

54. *On-line processing*: in order to settle on scope salience, the surface and inverse scope implicatures are computed (either locally or globally) and a consistency check then establishes the possible scopes and their saliency property. On this implementation, one should expect interactions between these implicatures and other implications or contextual information.
55. *Off-line principle*: the effects of implicatures are built into the pragmatic competence, e.g. through learning or some other sort of assimilation. The process of assimilation yields an ‘equilibrium’ state for the scopal readings. This equilibrium might be broken by further syntactic and pragmatic constraints.<sup>26</sup>

It is not clear how to decide between the two strategies, and I shall limit myself to some indirect remarks.<sup>27</sup> It might seem that

<sup>25</sup> Note that in order to benefit from the explanatory effects of the present pragmatic principles, we don’t need to commit to any such option, since the principles can be evaluated independently of implementation. However, in the long run something more precise has to be said about their implementation.

<sup>26</sup> Note that this is not particularly in tension with the online implementation. Rather, it presupposes that some invariants of the online processing are built into the linguistic system. Alternatively, we might remain agnostic about the relation between the two, and offer the latter strategy as an abstract description of grammar.

<sup>27</sup> The linguistic constructions that might be relevant for empirically distinguishing between the two implementation strategies are the numerical cases such as (46). These

the computation of the consistency test is too difficult to be part of the linguistic system. However, firstly, this is no more difficult than the computation usually assumed in the interface economy accounts, where mutual entailment should be tested in order to determine whether a given potential logical form can be licensed or not. Secondly, we should be uneasy about assessing what form of computational complexity can a human being bear, since we don't have an established tractability metric or a direct way to fathom our computational powers. It might turn out that things that seem difficult to us from a theoretical perspective take much less time to process online, and, conversely, seemingly simpler things are more difficult to process. More importantly, from our theoretical—as opposed to a practical—perspective, it is generally better to have a computationally burdensome mechanism that is conceptually adequate, rather than one that is not conceptually adequate but otherwise computationally more tractable. Therefore, unless we have an equivalent alternative, we seem to be entitled to endorse the online processing implementation of the pragmatic principles.

However, the online processing implementation is not the only option. It is true that in this chapter I have talked as if the account concerned online processing, and I have also appealed to some assumptions common to processing accounts (e.g. by my use of terms like *mechanism*, *computation* etc.). However, such talk is not necessary, and the current processing account may take more subtle forms. The pragmatic mechanism can provide the rationale for economy-like pragmatic principles. The pragmatic competence may type the linguistic operators according to their monotonicity and contain (de-feasible) generalisations as to which types of operator can or cannot cross each other. On this implementation, the scopal possibilities and their salience properties can be stated without appeal to the notion of implicature and consistency, but are nonetheless the result of the processing geared towards inconsistency, as spelled out by the CB account.

In other words, we can see the interface principles of economy—scope economy and generalised scope economy—as a (rough) reflex of the proposed controversy-based mechanism, but the CB account is distinct from the interface economy accounts, since the CB account is essentially semantic/pragmatic rather than syntactic. Moreover, as we have seen, the CB account covers data that are problematic for the strong economy principle.

---

constructions seem to allow for scopal readings even in the absence of concrete information conducive to inconsistency in the relevant implicature set. This possibility favours the second (off-line) strategy over the first (on-line) strategy. On the second strategy, the inconsistency is to do more with the aetiology of scope, or perhaps is just a purely abstract proposal independent of any implementation, along the standard 'competence' models in theoretical linguistics.

I used the notion of scope in the broadest sense possible, but many theoreticians see this notion as much more constrained. Thus, on the view put forward here, scope is not attributed to quantifiers only, but extends to other operators, such as intensional operators, bare plurals, and numerical quantifiers. In particular, scope does not depend on a restrictive definition of quantifier phrases, one which would not include e.g. indefinites. Indefinites enter scope interactions as well, since, in some cases at least, they have the same kind of intuitive truth-conditional effects as quantifiers.<sup>28</sup> Moreover, I have assumed that focus uncovers scopal possibilities. I have not argued for this more liberal notion of scope, but there is reason to think that my proposal will be relevant on other ways of drawing the boundaries of scope. As I remarked, the controversy-based account can be generalised to other types of structural ambiguities. Thus, even if we were more accurate in what we identify as scope,<sup>29</sup> the present pragmatic account would arguably remain in place, since it is primarily sensitive to truth-conditional properties and entailment patterns, rather than to the specifics of potential definitions of scope.

I made a first case for the difference between the extant economy principles and the CB account in terms of the general assumptions about explanation and their distinct predictions. To be sure, we have to devise new ways to compare and distinguish the economy principles by further linguistic tests. It would be also helpful to sharpen the account of the interaction between the pragmatic principles and other syntactic and semantic principles, e.g. by taking a closer look at the relation between intonation, focus and scope possibilities. In addition, the CB account needs development in order to pin down the rationale for having such a mechanism at the linguistic system's disposal. I cannot hope to cover all the scope data with the controversy-based account, and many of the examples discussed in the previous chapter remain still to be accounted for (e.g. the collective readings of *few* in (35), and the ACD example (52b)). However, I *can* give a coherent analysis of the cases that seem to be covered by both the original and the generalised (strong) economy condition, and then of some constructions that are problematic for those principles.

To be sure, syntactic constraints should definitely be taken into account, since scope seems to be dependent on such constraints. There

<sup>28</sup> However, note that indefinites played only a minor role in our discussion. In particular, I haven't relied on data involving indefinites in arguing against strong economy in the previous chapter. Furthermore, I am aware that the constraints on the scope of indefinites are significantly different from those of other operators, and thus that my account cannot satisfactorily cover indefinites in the absence of further constraints. Quite apart from direct constraints on scope, indirect constraints such as specificity—as e.g. proposed in Hawthorne and Manley 2012, p. 93—should be taken in consideration in order to make the right predictions about the scope of indefinites.

<sup>29</sup> See Szabolcsi (2010, 83ff) for an argument to the effect that scope is indeed a very broad and diverse phenomenon.

are well-known cases where truth-conditionally identical and neutrally marked sentences have different scopal properties.<sup>30</sup> It remains to be seen how best to conceive of the interaction between the CB account and the categorical syntactic constraints on scope. Whilst I do not deny that there are syntactic constraints on scope, I contend that they are *not* best seen as interface economy principles. Otherwise put, economy principles are better seen as a reflection of our pragmatic, controversy-based principles: Scope Admissibility and Gradability.

This completes the first part of the thesis. So far I have been concerned with the explanatory potential of the views of scope that give pride of place to economy considerations and entailment in grammar. I have found that a semantic/pragmatic account is more natural than the syntactic/semantic one, although it is clear that the precise form of the latter remains to be refined. It is thus a good idea to invest our efforts into exploring the empirical potential of the semantic/pragmatic account, by further examining (i) the role of contradictions in disambiguating scope, as well as (ii) the purported relation between scope and scalar implicatures. Even if the controversy-based account, in the present form, might not earn its explanatory keep, I think that the two independent ideas on which it is based are worth exploring, especially in the current research context where more and more refined theories of scalar implicatures and logicity of grammar are being developed.

In the next part of the thesis, I turn to the other area where economy principles seem to do a substantive explanatory work—the theory of binding. As in this part, I shall end up on the side of the semantic/pragmatic camp. But before reaching that point of the argumentation, we need to see why—and how—is economy supposed to answer binding problems.

30 There are cases that suggest that important syntactic restrictions on scope are in place. The following example from Aoun (1985, p. 164), credited to Noam Chomsky, is a case in point.

56. a) Someone expects that everyone will be elected.  $*(\forall > \exists)$   
       b) Someone expects everyone to be elected.  $(\forall > \exists)$

This contrast reflects the sensitivity of scopal possibilities to the type of clause (complementiser phrase) in which the universal quantifier is embedded. The syntactic constraint against inverse scope seems to be categorical and non-negotiable. However, our liberal account of scope is also compatible with having the syntax impose a strong, but non-categorical, constraint on the pragmatic scopal possibilities. Syntax will impose costs for specific scopal readings, but these costs can be traded off, and thus the syntactic constraints can be, at least sometimes, defeated or obviated.

## Part II

### ECONOMY-BASED ACCOUNTS OF BINDING



## 3 | BINDING ECONOMY PROBLEMS

### 3.1 INTRODUCTION

#### 3.1.1 The basic argument

This is the first of two chapters dealing with aspects of binding theory. In this chapter, I present a general methodological outlook on binding and set the stage for the positive account of binding phenomena that I will present in the next chapter.

At the most general level, the thrust of the argument is that invoking a two-sided communication between ‘modules’—specifically, syntax and semantics/pragmatics—is too costly as long as other models resting on one-sided communication are in view. From a design-perspective, any feedback from semantics/pragmatics to syntax implies that the entire, two-module, system has to do more work, because one of the modules has to do its work twice. This is not so on a standard, one-sided informational model. Further, the less two-sided informational transfers are documented empirically, the more problematic it is to posit an instance of such an informational transfer. Naturally, the usefulness of a given mechanism increases with its wider applicability in the system, but if the economy mechanisms are claimed to be just ‘exceptions’ they appear not to be very useful after all. As I shall make clear, the economy-computation seems rather marginal, even by the lights of their advocates. I think that we can eschew the suggested pitfalls of the standard economy accounts, and in this part of the thesis I seek to show that there is no need for positing a two-sided communication between the syntax and semantics/pragmatics, since accounts that assume a standard (one sided) informational link between the two ‘modules’ are equally appropriate for the main explanatory tasks.

In order to argue that the explanatory strategies in terms of interface economy have significant conceptual limitations, I shall take a distinctive methodological stance, and I shall stress the virtues of simplicity, economy, and non-*ad hoc*ness of an explanation over the virtues of another respectable theory choice criterion, namely, empirical adequacy. As far as this chapter’s negative argument is concerned, I do not pretend to offer conclusive arguments against interface economy principles, but just to show that they are problematic in a way that cannot be offset by their current empirical success. Moreover,

things will look significantly different for the prospects of the, currently dominant, interface economy accounts in case we could argue for a positive view that takes up their explanatory task.

This chapter and the next constituting the second part of the thesis share some structural and thematic ideas with the previous two chapters (making up the first part of the thesis). Just as in the case of scope phenomena discussed in the first part of the thesis, I shall start out by presenting the problems of interface economy, and then move to a more promising, pragmatic account that can deal satisfactorily with these problems. An important difference in the theoretical setting is that here I'm concerned with binding. This is not the place to review the vast literature on binding, but I shall present just enough to have a picture about the relevant explanatory problems, and how linguistic economy is supposed to tackle these problems.

### 3.1.2 Binding and economy

In stating the so-called *binding theory*, Noam Chomsky (1981) unified previous theoretical hypotheses about binding, and the resulting theory has ever since been considered one of the landmarks of syntactic analysis. As we shall see, this theory has far reaching implications in terms of the meaning of noun phrases such as pronouns, proper names, definites, etc., implications that can be drawn out by carefully studying the anaphoric relations between noun phrases.

The binding theory consists of three general conditions on the possible referential dependencies of noun phrases, that is, on how the referent of one expression depends on the referent of another. Thus, *John likes himself* and *John likes him* will, on the binding theoretic view, introduce contrasting referential dependencies. *Himself* depends as to its referent on the referent of *John*, whilst *him* needs to refer to a person other than John. *These are the basic consequences of the principles A and B of binding theory.* Moreover, the *Principle C* of binding theory disallows referential dependency in constructions such as *He likes John*, positing that proper names are always referentially independent; consequently, *John* cannot be understood as depending referentially on *he*. The relevant principles (or conditions) of the binding theory can be summarised roughly as follows.

#### 56. *The three principles/conditions of binding theory*

- Principle A: a reflexive should be bound in its domain.
- Principle B: a pronoun should be free (i.e., not bound) in its domain.
- Principle C: referential expressions (e.g. proper names, definites) should be everywhere free.

However, Gareth Evans (1980) demonstrated that some initial versions of the binding principles have clear counterexamples, and, arguably, his counterexamples carry over to Chomsky's statements of the binding principles as well. Several other counterexamples have been acknowledged since the very beginning of the binding-theoretic approach. At the same time, in the linguistics literature, Tanya Reinhart (1983a) tried to accommodate some of these difficulties by appealing to a certain division of labour between syntax and semantics/pragmatics. In this part of the thesis (and especially in the next chapter) I shall build on the tradition initiated by Reinhart, trying to explore a general semantic/pragmatic solution to binding theoretic problems, such as the Evans-type counterexamples and many other interesting, but less well known cases, which so far seem to resist a unitary account.

In the present chapter, I start with the exposition of two economy principles (§§3.2.1–3.2.2.) and argue (in §3.3) that they suffer from lack of conceptual and methodological motivation, mainly because they are not in line with the fruitful role the economy principles were designed to have in the binding-theoretic framework broadly conceived. This shows that, from a broadly explanatory perspective, the truth-conditional (interface) economy principles provide 'diminishing returns'.

In making my methodological claims, I assume two desiderata for an economy based account. These desiderata are distilled from the original motivation for positing linguistic economy principles, as formulated in the initial economy-based frameworks. Firstly, the overall aim of economy principles was to secure a unification and simplification of the grammar, and to generalise over a vast array of linguistic phenomena (Chomsky 1995, cf. Chomsky 1981). Secondly, the economy principles have semantic/pragmatic motivation, as argued most forcefully in the leading account of binding economy phenomena due to Reinhart (1983b). (See chapter 1 for a more precise articulation of these two desiderata.) Within the mainstream economy-based accounts, these desiderata appear to be inconsistent, but, in fact, they can be met within a non-standard account. After showing that some recent uses of the economy principles fall short of these and other related methodological standards, I explain why the two desiderata are important, and, in the next chapter propose a general economy-based account of binding that meets both of them.

My critical discussion is based on two study cases, both of which involve principles of truth-conditional binding economy. According to our working definition of economy, a principle of economy regulates the competition between two or more linguistic forms. The linguistic forms entering the competition have to satisfy certain grammatical requirements. The study-cases are formulated in terms of a particular type of economy principle, viz. truth-conditional economy. On

the truth-conditional account of economy, the winning strategy has to do with the ‘novel’ truth-conditions (or semantic payoffs) that a linguistic form can bring. The novelty of the truth-conditions should be assessed relative to the available alternatives, i.e., relative to the truth-conditional meanings of the competitors. Naturally, in the context of binding, the economy competitors will involve linguistic forms that realise (or fall short of realising) a certain type of binding relation. The truth-conditional economy principles are ‘interface’ principles because the syntactic well-formedness of linguistic forms depends on some of their semantic properties. Therefore, in order to establish the grammaticality of a certain linguistic form, grammar should consult the interface between syntax and semantics/pragmatics.

### 3.2 BINDING ECONOMY: STUDY-CASES

#### 3.2.1 Economy and the *de se/de re* distinction

##### 3.2.1.1 De dicto vs. de re vs. de se

It is important, first, to settle on a working terminology regarding some widely discussed notions in the linguistic literature, whilst remaining neutral with regard to how best to conceive of the syntax and compositional semantics associated with these notions. To begin with, I distinguish between *de re*, *de dicto*, and *de se* interpretation of linguistic expressions. These notions are tied up with the possible attitudes one might have in using words with *de re*, *de dicto*, and *de se* interpretations. In this chapter, I am concerned with attitude *ascriptions* or *reports* rather than with the psychological attitudes themselves, as only the former are linguistic phenomena proper. A *de dicto* interpretation of an expression is given by what an attitude holder knows about that expression, or, more precisely, by a description which underlies the attitude holder’s interpretation of that expression. The interpretations which are said to be *de re* are taken here to mean that the corresponding expressions are directly referential and invariant across possible worlds. Once the denotation of an expression is fixed, the denotation of the expression will remain the same in all the possible situations in which we might use the expression. Let us illustrate.

#### 57. *De dicto vs de re*

- a) Helen believes that *the student who got the highest mark* is the best.
- b) Helen believes that *Maria* is the best.

The *de dicto* interpretation is obtained in (57a) in case Helen is reported as thinking of the referent of the definite *the student who got the*

*highest mark* through the descriptive condition *student who got the highest mark*. In other words, it is perfectly compatible with positing a *de dicto* attitude that Helen does not know who the student in question is. The student in question is whoever meets the descriptive condition. According to the *de dicto* ascription there may be many possible referents of the definite as far as Helen's beliefs are concerned. In contrast, in the case of *de re* attitude ascriptions, Helen is reported as referring to a particular individual, irrespective of the descriptive conditions that particular individual satisfies. In (57b), the particular person is Maria. *De re* ascriptions are not restricted to utterances consisting of proper names, like *Maria*. For instance, we could say that Helen believes that *she* is the best, as long as we make clear what the referent of the pronoun *she* is, and, in particular, that the pronoun refers to Maria. Likewise, a definite like *the student who got the highest mark* can be also used to pick out in a *de re* manner Maria. But in this case, as opposed to the *de dicto* reading which is intended for the same definite in (57a), the descriptive condition is not essential: it is just used in order to pick out a unique individual. When the speaker ascribes a *de re* attitude whose embedded clause contains a definite description (e.g. *the student who got the highest mark*), the descriptive condition (in the definite description) fixes for the speaker/ascriber the referent of the definite description.

*De se* expressions express first-personal attitudes. This amounts to saying that, in using a *de se* expression, the attitude holders are well aware that the attitude is targeting themselves, rather than some other persons whose full identity is unknown to the attitude holders. Take for instance

58. I believe I am the best in my class.

An ascription of *de se* belief asserts that not only I believe that a particular person, Andrei, is the best in his class, but moreover that I am aware (and thus also believe) that it's me who is the best. The crucial distinction can be presented by the direct discourse I'm able to make in the context of the ascription in (58). I may be able to say only *That person is the best in my class*, in which case I am ignoring the identity of that person. This is a non-*de se* attitude. But I may be able to say *I am the best in my class*, in which case I know the identity of that person, and, crucially, I know that that person is myself. So a *de se* attitude requires self-awareness and reporting that someone has a *de se* attitude is also reporting that that person is aware that *she* (as opposed another person that may share all the relevant properties) is the object of the attitude.

Now, these are the intuitive distinctions between *de dicto*, *de re*, and *de se*. It is possible to define these notions so as to have *de se* as a species of *de re*, and *de re* as a species of *de dicto*. We use the apparatus of centred possible worlds, pairs  $\langle w, x \rangle$  consisting of a possible

world  $w$  and an agent  $x$  who is the centre of that world. Any centred propositional content  $p$  of a purely *de re* (i.e. non-*de se*) attitude is such that it satisfies the *triviality condition*:  $\langle w, x \rangle \in p$  iff  $\langle w, y \rangle \in p$ , for any world  $w$  and agents  $x$  and  $y$ . Otherwise put, *de re* contents do not depend on the centre (agent), and thus are like propositions in the possible worlds semantics, i.e., are sets of possible worlds (which can be thought of as worlds where that proposition is true). A *de se* propositional content does not satisfy the triviality condition, and hence is a more fine grained centred proposition in which the centre makes a difference. For any trivial centred proposition there will be many non-trivial centred propositions, and thus someone may believe the former proposition without believing any of the multiple corresponding non-trivial centred propositions. In a similar vein, we can ascribe belief in the former without ascribing belief in any of the latter.

Furthermore, we can think of *de re* semantic values as actualised *de dicto*. That is, for any expression  $e$  interpreted *de re*, the semantic value of  $e$  across possible worlds is the semantic value that  $e$  has at the actual world  $w@$ . The same expression  $e$  interpreted in a general (non-actualised) *de dicto* fashion will have the same semantic value at  $w@$  (as the *de re* semantic value), but will have different semantic values at other possible worlds.

The *de re* propositional contents (sets of trivial and non-trivial centred worlds) will be subsets of *de dicto* propositional contents, because the former do not display the variability of the latter across possible worlds. To illustrate, (57a), *Helen believes that the student who got the highest mark is the best*, is a report of an attitude whose content is the set of centred worlds  $p$  in case the attitude is *de dicto* and  $q$  in case the attitude is purely *de re*. (I leave aside, for the moment, the irrelevant centre coordinate and look only to the world coordinate of the centred possible world parameter.) Now, because the *de re* interpretation of the description *the student who got the highest mark* refers to a unique student  $s$  in all the worlds in which  $s$  exists,  $q$  will be the set of worlds where  $s$  is the best. It is clear that  $p$  is a superset of  $q$  since, according to the *de dicto* interpretation of the description, many people (including  $s$ ) may satisfy the description at various possible worlds.<sup>1</sup>

Before examining our study-case proper, two specific terminological points remain to be made. Firstly, logophoric or [log] elements are those expressions that are automatically interpreted as referring

<sup>1</sup> The semantics of attitude verbs is not my focus, but it is useful to know that such a semantics is definable in terms of the notions just introduced. To believe a centred proposition  $p$  is for each centred world compatible with one's beliefs to satisfy what is asserted in that proposition. In the pure *de dicto* and *de re* cases, the  $p$  should be compatible with what the agent believes, i.e., the worlds compatible with what the agents believes must be a subset of the worlds of  $p$ . A *de se* belief is a belief according to which all the centred propositions  $\langle w', x' \rangle$  are such that  $x'$  is the attitude holder (or its counterpart) in the belief worlds. Ascriptions of belief may be ambiguous between *de re*, *de se* and *de dicto*.

to the attitude holder of the main clause. Another notion that will play a key role in the coming discussion is the notion of *guise*. For the purposes of this chapter, I take guises to be disguised definite descriptions, and I leave the nature of definite description unanalysed.

### 3.2.1.2 *Economy of the de se and de re*

Several theorists (e.g. Buring 2005; Heim 1998; Schlenker 2005) have suggested that, for binding theory to become more empirically adequate, we need to formulate the semantics of noun phrases in terms of guises. As I shall show, guises play a crucial role in accommodating important counterexample to binding theory, if they are supplemented by the right principle of economy. Let us assume for the sake of argument that the right principle of economy is one that imposes the closest binding link (Fox 2000). For instance, when a pronoun (e.g. *me*) appears in a sentence, linguistic economy requires that the pronoun should ‘look for’ the closest binder (e.g. proper name, operator etc.). The pronoun in question will take as its semantic value a guise, viz. the descriptive designator under which the referent of the pronoun is given (see §0.2.3 in the introduction). Against this theoretical background, Anand (2007) suggests that even if guises are in general available, in certain contexts they are not relevant for the economy mechanism. More precisely, the thought is that the economy principle is insensitive to the distinction between *de re* and *de se*. Let us look more closely at the role of the ‘insensitivity’ assumption in analysing the target linguistic data. Anand contends—building on observations by Chierchia (1989)—that a special operator,  $OP^{\log}$ , is at least some times responsible for the *de se* readings of pronouns such as *me* in the example below. Anand’s data, with the binding items (binder and bindee) highlighted in grey, are the following.

59. I dreamt I kissed me.

- a) I dreamt  $OP^{\log}$   $\lambda x$  I  $\lambda y$  kissed  $me^{\log_x}$ .    *non-local binding*
- b) I dreamt  $OP^{\log}$   $\lambda x$  I  $\lambda y$  kissed  $me^{\log_y}$ .    *local binding*

The construction (59) is part of a longer discourse to the effect that Lakoff dreamt that he was Brigitte Bardot and that he kissed himself. The dreamer as well as the reporter in this scenario is Lakoff (the example was originally introduced by Lakoff 1972). The ‘local binding’ logical form (LF)—the LF in which the binder and the bindee are linked at the shortest distance—violates the requirement that [log] elements must be bound by the logophoric operator. Further, the argument goes, the non-local binding LF won’t do either, since it violates binding economy, which enforces local binding. If so, the logophoric expressions (pro and *de se* anaphors) cannot be bound by a *de re* expression. The principle of economy coupled with an ‘insensitivity’ assumption (to be spelled out below) explains a more general



phenomenon that Anand calls *de re blocking*<sup>2</sup>: expressions with *de se* denotations cannot be c-commanded by expressions with *de re* denotations.<sup>3</sup> The key idea is that there is a conflict between economy (*qua* minimize the binding link) and the logophoric constraint (requiring that logophoric operators bind logophoric pronouns) solved in favour of economy under the assumption that economy does not see truth-conditional distinctions. It follows that *de re* NPs cannot c-command *de se* ones. The proposal seems to yield the right prediction, but, as Anand is first to point out, there is a natural question we should ask before endorsing the *de re* blocking account: Are we entitled to assume that these two representations are economy competitors in the first place?

As Anand remarks, the two—local and non-local—representations are not truth conditionally or denotationally identical, so normally they shouldn't be competing with each other.

The local binding produces a *de re* reading and the non-local binding produces a *de se* reading. Lakoff's dreaming that he himself was kissed is different from dreaming that the individual who was kissed is some some person who, unknown to the dreamer, happens to be Lakoff. The dreaming agent may fail to know the identity of the person in the latter case, whilst such misidentification is impossible in the former case.

However, the explanation would work in case we posit that Binding Economy doesn't 'see' the distinction in truth-conditions (or denotation), and rules out non-local binding. In the introduction I made the distinction between syntactic and semantic principles of economy. The principle of binding economy falls in the latter category. Consequently, many would frown upon Anand's economy based mechanism which fails to discriminate between the meanings of the two logical forms. After all, the principle is a *semantic economy* principle in virtue of its pursuing semantic payoffs. Anand proposes a further hypothesis that makes the insensitivity assumption more palatable, namely that condition A—regulating the binding of reflexives—manifests the same kind of insensitivity.<sup>4</sup>

For our purposes, the key feature of the first study-case is that the principle of binding economy is claimed to show *insensitivity* to some form of truth-conditional content. The economy computation is thus modular, in the sense that it cannot be altered unless certain

<sup>2</sup> See Anand (2006, p. 52, 2007, p. 10).

<sup>3</sup> C-command is the standard structural restriction on binding. In particular, the antecedent (binder) should be in a position that c-commands the bindee in the syntactic tree. For a node A in the syntactic tree to c-command another node B, it should be the case that the first branching node dominating A, also dominates B. In other words, assuming binary trees (viz. trees in which at most two branches can branch off a node), A is in a c-commanding position relative to B, if it's B's sister, or is sister to a node dominating B.

<sup>4</sup> I shall give a different justification of the apparent insensitivity of reflexives in the next chapter, §4.4.1.

semantic/pragmatic conditions are met. In the light of the original pragmatic-based proposal behind the economy principles, this appeal to economy seems to lack motivation, since it is not entirely clear what pragmatic purposes such computation might fulfil. Indeed, it seems that this computation can hardly fulfil any pragmatic purpose whatsoever.

However, it might be argued that the proposal does make sense from a syntactic and semantic point of view insofar as it covers some data that were previously deemed to be problematic. Therefore it is worth weighing the different aspects of the economy account in order to see whether the previously mentioned failure is theoretically acceptable after all. I shall turn to a full assessment of this use of linguistic economy shortly, and in the next chapter I shall discuss the same data from a different theoretical perspective.

### 3.2.2 Economy in copular constructions

#### 3.2.2.1 *Copular constructions and connectivity effects*

There are several types of copular sentences, among which are the specificational and predicational constructions. The distinction between specificational and predicational copular sentences is still under debate. (See Mikkelsen 2011 for a good survey.) Broadly, predicational sentences typically involve a referential or quantificational phrase in the subject (pre-copular) position, and a (post-copular) predicate complement expressing the property of the subject's denotation. In other words, the predicational sentences predicate something of the subject. They assert that the denotation of the subject has a certain property, or, alternatively, that the denotation of the subject is a member of a certain set of entities. Specificational sentences are used to specify who (or what) something is; they are primarily meant to identify the (denotation of the) subject rather than assert something about it. As Mikkelsen (*ibid.*) suggests, we may think of the subject of specificational sentences as introducing a variable whose value is then provided by the post-copular phrase. By contrast, specificational sentences identify two denotations (individuals, properties, or other types of semantic value).

Sharvit (1999, p. 302) points out that a way to disambiguate the specificational and predicational readings of a pseudo-cleft (copular) sentence such as *What John is reading is a book about himself* is to observe the effects of conjuncts added in the post-copular phrase. Thus, e.g., *What John is reading is a book about himself and three other books* has a salient specificational reading, according to which the group of books that John is reading consists of four books (one about himself and three other books). Note, in contrast, the salient reading of *What John is reading is a book about himself and a total bore* entails that John is reading only one book. The sentence asserts that this book has

two properties: the property of being about John and the property of being a total bore. This reading is the predicational reading.<sup>5</sup>

The second study-case involves binding economy in copular sentences. To motivate this principle, let us look at the connectivity phenomenon. Sharvit (1999) remarks that several binding constructions, and in particular, *specificational* sentences, obey restrictions that, given their grammatical configuration, they shouldn't obey. In other words, these specificational constructions behave as if they were in a different grammatical position (in the phrase marker or tree) than the one they are actually in. These are the so called *Connectivity* effects. Here are a few examples.<sup>6</sup>

60. *Bound Variable Connectivity* (*ibid.*)

- a) The woman no man<sub>i</sub> listens to — are his<sub>i</sub> wife and his<sub>i</sub> mother in law.
- b) What no student<sub>i</sub> enjoys — is his<sub>i</sub> finals.

61. *Binding Theory Connectivity* (*ibid.*)

- a) What John<sub>i</sub> is — is a nuisance to himself<sub>i/\*j</sub>. Principle A
- b) What John<sub>i</sub> is — is a nuisance to him<sub>\*i/j</sub>. Principle B
- c) What he<sub>\*i/j</sub> is — is a nuisance to John<sub>i</sub>. Principle C

The problem raised by connectivity constructions is this. In order to exhibit the binding patterns they exhibit, the specificational sentences need to have the post-copular phrases in the place indicated by the gap in the pre-copular phrase. By way of illustration, consider the following sets of sentences, where (a) consists of a specificational copular sentence that exhibits connectivity, (b) is a non-copular paraphrase of the previous sentence in which the binding expressions (a noun phrase and a pronoun) stand in the standard structural relation (viz. c-command), and (c) is a non-copular sentence where the standard structural relation does not hold between the binding expressions.

62. *Bound Variable*

- a. What [every superhero]<sub>i</sub> keeps an eye on is his<sub>i</sub> arch-enemy.

<sup>5</sup> To get to the predicational reading of e.g. *What John is is a nuisance to himself*, Sharvit suggests, we need to take the free relation *what John is* to mean something akin to *being what John is*, e.g. *a perfectionist*. According to the predicational reading of the previous sentence, being a perfectionist (what John is) is a member of the set of things that are a nuisance to John. In contrast, the specificational reading of the same sentence has it that the property of being John is identical to the property of being a nuisance to John.

<sup>6</sup> As usual, I use indices *i*, *j* etc. in order to represent the binding relations: two expressions are bound just in case they bear the same index. Stars \* represent the unacceptability or deviance of a given sentence, and, in this case, they represent the unacceptability of a sentence bearing such and such indexation.

- b. [Every superhero]<sub>i</sub> keeps an eye on his<sub>i</sub> arch-enemy.
- c. \*Before Spiderman<sub>i</sub> took off, Gwen taught himself<sub>i</sub> a physics lesson.

63. *Principle B*

- a. \*What Spiderman<sub>i</sub> did next was refer him<sub>i</sub> to some scientific applications.
- b. \*Spiderman<sub>i</sub> referred him<sub>i</sub> to some scientific application.
- c. Before Spiderman<sub>i</sub> took off, Gwen showed him<sub>i</sub> a nice equation.

As can be observed in these examples, there is always a contrast between (a) and (c), whilst (a) and (b) pattern alike. It follows that the pronouns within the post-copular phrases (the phrases which exhibit connectivity) in the (a)-sentences above behave as if they realised the structural relations in question; specifically, they behave as if they were c-commanded by their respective antecedents in (62) and as if they were not c-commanded by their respective antecedents in (63). These structural relations seem to be missing from (a) but are certainly realised in (c). (Note that similar patterns occur with the principles A and C of binding theory.)

We thus have to reconcile the binding patterns realised by the noun phrases with their surface position, which, under standard assumptions, do not allow binding. Sharvit further observes that, in general, only specificational, but not also predicational, copular sentences exhibit Connectivity. The explanatory task is to explain why this happens. Why does connectivity correlate with specificational but not with predicational readings?

64. *Specificational and Predicational sentences show a contrast wrt Connectivity* (adapted from Sharvit 1999, 303, ex. 17)

- a) \*What he<sub>i</sub> is reading is a book about John<sub>i</sub> and three other books.
- b) What he<sub>i</sub> is reading is (both) a book about John<sub>i</sub> and a total bore.

Assuming that the judgements of acceptability in (64) are correct, the problem is how to explain the contrast between the specificational construction (64a) and the predicational construction (64b). The contrast concerns the fact that only the former manifests connectivity.<sup>7</sup>

Connectivity is to be explained, on Sharvit's account, by noting the connection between 'pair-list' and 'natural-function' readings in questions, on the one hand, and the corresponding specificational

<sup>7</sup> This type of connectivity involves the familiar Principle C effect, in the absence of the required structural relation. Similar contrasts can be formulated for the other two binding principles.

and predication readings of the sentences in question, on the other. Note the contrast between the possible answers to the question *Which woman does every man love?*, on the one hand, and *Which woman does no man love?* and *Which woman do most men love?*, on the other hand. The contrast concerns the possibility of a ‘pair-list’ answer. Such an answer can be given only to the first type of question, e.g. John loves Mary; Bill, Sally; Chris, Sadie and so on until we list all the men paired with women they love. The pair-list readings are not available for the second type of question. However, natural-function readings are available for both types of question. An appropriate answer to such a reading of the questions is to give the name of the woman whom no man (or most men) love. These are natural-function readings because they are based on relative clauses denoting a (natural) function e.g. from men to the women they love.

I shall omit here the details of the explanation, as they are not essential to how the economy principle is applied.<sup>8</sup> The key point is that the same kind of ambiguity is found with relative clauses (e.g. *what John is*) in pseudo-cleft sentences, and that it is this ambiguity that is responsible for the distinction between specificational and predication copular constructions.

### 3.2.2.2 A revised Binding Economy principle

Let us focus on the connectivity problem concerning the binding conditions B and C. The contrast that needs explaining is the one between (65) and (66) below, where specificational constructions with *John* coreferring with the pronoun is possible only in the former, (65). (I take coreference to mean covaluation without syntactic binding, that is, without coindexation—or an equivalent machinery—‘in the syntax’.)

65. What John is shaving is a pet which belongs to him.  
*predicational, specificational*

66. What he is shaving is a pet which belongs to John.  
*predicational, \*specificational*

The correct interpretation of these constructions is not obvious to me, but I adopt Sharvit’s judgements, and focus on the economy aspect of the explanation.<sup>9</sup>

<sup>8</sup> The natural function relative clauses give rise to specificational readings and the pair-list relative clauses give rise to predication readings. Bound variable connectivity effects disappear from predication (pair-list) copular constructions when the quantifier in the relative clause has either empty or non-unique domains (as is the case with *no man* and *most men*). Thus, among predication constructions, only those whose relative clause contains universal quantifiers exhibit connectivity. In contrast, any quantifier in the relative clause of a specificational construction is compatible with connectivity.

<sup>9</sup> In the next chapter I shall find that we can formulate a more elegant account of binding on the assumption that such contrast does not exist. However, these con-

The key point is that in order to explain the Principles B and C effects, Sharvit appeals to a version of the Rule-I, which is a principle of economy similar to the one invoked before (Grodzinsky and Reinhart 1993; Reinhart 1983a).<sup>10</sup> Recall that a principle of economy involves competition between logical forms according to the truth-conditional meaning they give rise to. In particular, the economy principle favours bound readings over semantically/pragmatically indistinguishable coreferential readings. Sharvit puts forward a revised version of the economy principle according to which (in my terminology) *special* bound readings are favoured over indistinguishable coreferential readings. Special bound readings are indirect binding configurations obtained by replacing the name *John* with a pronoun coindexed with the subject in the relative clause, and the trace in the gap between the pre- and post-copular phrases with a double indexed trace. This trace will indirectly bind the newly introduced pronoun to the subject. These transformations produce a (bound reading) competitor for the coreferential reading. For instance, by applying the transformations to (66), we get: *What<sub>j</sub> he<sub>i</sub> is shaving  $t_j^i$  is a pet which belongs to him<sub>i</sub>.*

These readings are part of a reference set—set of competitors—that is formed for the purpose of examining their ‘economy’ features, that is, their truth-conditional contributions. So, in the reference set for each of the (65) and (66), there will be a binding and coreferential logical forms.

Sharvit argues that the specificational (natural function) coreference reading of (66) can be obtained *via* a minimally different indirect binding mechanism, and thus this specificational coreferential reading should be disallowed. That this is so can be checked by using the following test.

67. What John/he is shaving is a pet which belongs to him and three of Mary’s dogs. Bill is doing the same thing.  
(Sharvit 1999, p. 333)

The first sentence should be disambiguated in favour of the specificational sentence, according to the disambiguation test above. This sentence arguably has the configuration obtained by the application of the transformations presented earlier, with the pronoun *him* bound by the subject in the relative clause (*John/he*). An indication that this is so is given by the interpretation of the second (elided) sentence. The second sentence can be interpreted as saying that Bill is shaving a pet

---

structions are complicated. I had begun by failing to see any contrast here, and several of my informants had not been able to see the contrast either. At a later stage of drafting this thesis, I began to see the contrast. Now, I’m simply not certain. In any case, see footnote 36 for a way to accommodate this contrast in our favourite framework.

<sup>10</sup> See also Cecchetto (2000) for a very similar economy-based approach to the interaction between connectivity and the principle C effect.

which belongs to Bill. (Assuming parallelism of structure between the two sentences, it is plausible that the subject and the pronoun are coindexed in the first sentence.) Therefore, we get a specificational (indirect) binding reading that is intuitively equivalent to the specificational coreference reading (66), and, consequently, the economy principle rules out the latter reading.

In contrast, the predication coreferential reading is allowed, essentially because pair-list operators are involved. The contribution of a pair-list operator cannot be simulated by the special binding transformations described above (whilst the natural function relative operator is the usual lambda abstractor, which is present in the bound reading).<sup>11</sup> Hence, the following construction

68. What John/he is shaving is a pet which belongs to him and a terrible nuisance, and what Bill is shaving too.

is the bound reading obtained by applying the special transformations to the predication interpretation of (66) (and contains a further conjunct to make salient the predication reading). Now, the crucial claim is that the logical form of (68) features a pair-list operator and is distinct from the coreferential predication LF in (66). To quote Sharvit, the reason why (66) should be grammatically licensed is the following.

The [natural function relative operator] is just a lambda-abstractor, and is basically the same lexical item used in ‘individual’ relative clauses. But the [pair-list relative operator] is a different lexical item – it combines with the subject so as to extract a witness set from it ... In other words, the pair-list (bound variable) LF of (106) [our (68)] and the coreferential predication LF of (103) [our (66)] are not minimally different from each other. Therefore, Rule-I does not rule out the latter. (Sharvit 1999, p. 334)

Notice though that the specificational reading of (66) and the corresponding natural function reading—obtained by making the minimal changes above—are *not* exactly equivalent. Hence, indistinguishable interpretation should be read as “indistinguishable for all pragmatic intents and purposes.” In Sharvit’s words,

If this approach is to be pursued, more changes are needed in Rule-I. For one thing, we have to specify exactly what we mean by “indistinguishable.” We do not want this to mean “equivalent,” for the following reason.

<sup>11</sup> I do not demonstrate the points made in the last three paragraphs, because they would require to lay out the compositional semantics of specificational and predication. This would take me too far afield, but see Sharvit (1999) for a full discussion of these points.



We rule out the specificational reading of (103) [our (66)] due to the existence of a corresponding functional reading, which, as (110) [omitted here] shows is not equivalent. It seems that we need to define “indistinguishable” in more pragmatic terms. This is just one of the problems that this approach faces, but the crucial point is that once we are forced to give up the idea that only c-command relations give rise to Connectivity, we have to acknowledge the fact that coreference phenomena require a theory of Principle C phenomena which is different from the one offered by the standard GB [Government and Binding] approach. (Sharvit 1999, p. 334)

We are now in a position to see the common pattern in the two study-cases of economy-based explanations of binding phenomena. The key point is that, similarly to the *de se/de re* cases above, the economy principle invoked here is *insensitive* to some truth-conditional distinctions which would be in principle available (although it is sensitive to other truth-conditional distinctions). As we have seen, Sharvit acknowledges that the economy principle is problematic, but suggests that a pragmatic motivation might be ultimately given for it. Hence, in contrast to the previous economy-based analysis, here the motivation for insensitivity is pragmatic rather than modular.<sup>12</sup>

In the following I argue that this application of the economy principle is indeed problematic, and that it is not clear that a refinement of the principle will do all the explanatory work Sharvit expects from it. The problems with the notion of economy are much deeper.<sup>13</sup> However, I’m sympathetic to the point she makes in the last part of

12 Were there some contextual, pragmatic motivation for distinguishing between the two, Sharvit would predict that the specificational reading would be available. Since I can see no contrast between the availability of predicational and specificational readings of (66), I find it difficult to test this prediction, and I shall leave this purported pragmatic character of indistinguishability aside.

13 Since the following discussion will be conducted at a general level, let me register here (without argument) the main problems that I find with Sharvit’s account. A problem is that even if we find formal differences between the logical forms of the predicational coreference and binding readings, these do not straightforwardly translate to truth-conditional differences between the two kinds of reading. Further, I think those differences cannot be found in the data: the two forms of predicational sentences do not seem to differ in truth-conditions. More importantly, if we consider purported difference between, on the one hand, how the predicational coreference and binding readings truth-conditionally relate to each other, and, on the other hand, how the specificational coreference and binding readings do, it is not clear that we can find a notion of indistinguishability that would classify the former as distinct and the latter as similar. What is the evidence for the claim that the pair-list operators produce pragmatically significant distinctions between the bound and coreference readings? On the face of it, the purported truth-conditional difference between the predicational coreference and bound readings is similar to that between specificational coreference and bound readings. This is reason to deny that there really is a contrast here between predicational and specificational readings with respect to coreference interpretations.

the paragraph just quoted, to the effect that we need an approach to principle C phenomena that is more flexible than the standard Government and Binding approach. (I shall defend such a position in the next chapter.)

### 3.3 SHORTCOMINGS OF ECONOMY

In order to assess the two uses of economy principles, we need to recall what theoretical purposes the economy principles needed to fulfil. The economy principles invoked in the two case studies above are truth-conditional, as they are sensitive to the semantic values of entire logical forms (LFs) rather than to the semantic values of certain non-sentential expressions.

The idea underlying the linguistic frameworks that utilised such principles of economy—e.g. the minimalist program and, before it, generative semantics—was to make these principles explanatorily central. In this spirit, their contribution was to make the account simple and general. From a semantic/pragmatic perspective, the principles of economy intervened in the grammar in order to make the LF of some utterances compliant with the discourse role of the utterances. (Heim 1998; Reinhart 1983a). It is these two ‘original’ desiderata that I take to be central to evaluating the explanatory role of more recent principles of linguistic economy (see §0.2.1).

However, the role of economy principles has changed over time. Starting with Reinhart (2006) they are explicitly seen as a sort of *repair strategy*. When the communication between syntax and semantics/pragmatics is less than optimal, the economy mechanism acts as a fix. In Reinhart’s terms, “the repair strategies involve the application of an illicit operation, which is only motivated by the fact that the output representations of the CS [computational system/syntax] are not sufficient for the interface needs” (*ibid.*, p.6, cf. pp.37ff.). The role of the economy principle is to ensure that the application of the illicit operation (to obtain such and such logical form) is in effect the best possible solution available.

A similar reasoning also seems to underlie other theoretical uses of linguistic economy that are not explicitly stating economy as a repair strategy (e.g. the account of Fox 2000 is based on a modularity assumption which implies, as the repair strategy approach does, that obviation based on economy is an exception due to truth-conditional payoffs). I contend that using them as repair strategies implies that they no longer play a central explanatory role, and they appear to be explanatorily rather marginal. Moreover, as I shall explain, the economy principles are computationally and methodological problematic. To support my claims, I rehearse the main features

of the principles of economy, as applied in the previous study-cases (*de se* pronouns and copular sentences).

We may think of economy principles as extra-constraints (of a more global nature) on the outputs of syntactic derivation, whose main goal is to avoid over- or under-generation, as the case may be. At first glance, this seems to be a beneficial feature. From a formal and computational point of view though, economy principles have very strong generative power, as they can generate competitions in many other parts of the grammar; they also risk becoming computationally intractable.<sup>14</sup> In other words, whilst the economy principles have some *prima facie* benefits, they could spell trouble in other domains. From a methodological point of view, the strength of economy makes them basically fit to be applied everywhere. This is a dangerous property, if they are taken to suggest tractable lines of research. Let me be more precise about where the danger lies.

To begin with, I find problematic the theoretical effects of admitting ‘repair strategies’ (and the related notion of ‘modularity’). The use of linguistic economy principles as a ‘repair strategy’ has an epistemic (and explanatory) downside. An important feature of their application so far was that the economy principles were invoked when theorists had no other way to explain some data. But their success in these cases comes as no surprise given their strong expressive power: arguably, almost any logical form that we want ruled out or ruled in will have a semantic contribution that may figure in the statement of an appropriate principle of economy. I think that this great expressive force and the accompanying epistemic downside are symptomatic of our two case studies as well. In order to mitigate this apparent problem, interface economy principles were restricted by the following constraint. It is only when the semantic payoffs of economy principles *could not be obtained by other grammatical means* that they are allowed to apply.

However, note that there is still something unsettling in the usage of such a principle, (a) about the way semantic payoffs are invoked, and, more generally, (b) about the counterfactual involved in the statement of the principle (see the italicised phrase). I shall argue on the basis of these two points, that this epistemic downside cannot be alleviated, and that ultimately several recent applications of the economy principles appear to be *ad hoc*. Let us expand on each of these two points.

Semantic payoffs?

The first point is relatively straightforward. The semantic payoffs at the interface between syntax and semantics are elusive ‘creatures’.

<sup>14</sup> See D. E. Johnson and Lappin (1999) and Potts (2001), but cf. also Chomsky (1995, 161,181,200ff) and Reinhart (2006, pp. 21-25,38-39)

If we abstract away from the particular empirical roles of the economy principles and focus on their general explanatory role (across a broader set of distinct phenomena), we get to the crux of the problem. On the one hand, we invoke semantic payoffs when, according to the standard economy view, no other grammatical trick could give such payoffs, on the other hand, we allow ourselves to tweak the notion of semantic payoff (or the insensitivity of economy to such payoffs) when it doesn't fit well with the data. That is, we modify what we mean by *indistinguishable interpretation* as we go along, or, alternatively, we freely modify the sensitivity of the economy-mechanism to fit with the data.

In the original Reinhart-Evans examples, the economy principles applied because a semantic *and pragmatic* payoff was in view. In our two study cases, the economy principles apply in different ways, basically because they do not 'see' the semantic payoffs. Recall that in the first study case, the blocking effect was explained in terms of an economy-based competition where the economy principle was crucially insensitive to the distinct meanings of the competitors. Likewise, economy does not 'see' semantic differences in copular sentences. The specificational reading of the construction where the pronoun seems to antecede a pronoun is distinct from the specificational reading of the corresponding construction with the proper name anteceding the pronoun, but still the economy principle is not sensitive to this distinction. Since the semantic payoffs cannot have an impact on the way these principles act, no pragmatic payoffs are in view either. But if the primary purpose of positing sensitivity to semantic payoffs of the economy principles in the first place was pragmatic—viz. geared towards communicative purposes—then the sporadic blindness of the economy principles seems to be suspect.

I don't think that a proper answer to this objection is to 'parametrise' for semantic/pragmatic sensitivity, that is, to claim that there are two disjoint cases where economy principles apply: those cases where meaning matters, and those where meaning doesn't matter. This, it seems to me, makes the problem brought about by two case studies more acute instead of mitigating it, because the very idea of economy was motivated on grounds of semantic/pragmatic payoffs. It is worth stressing, once more, that these payoffs were an essential part of the data in the Reinhart-Evans cases: we could clearly see that a binding principle is trumped for some communicative purpose, and this is reason to believe that the competition between linguistic forms exists. But if we lose track of such semantic/pragmatic payoffs, we remain with no more than a mere theoretical possibility that competition between logical forms exists.

## The counterfactual and related problems

An equally problematic issue concerns the counterfactual underlying linguistic economy. I should say up-front that the ‘counterfactual’ issue is not entirely specific to the current case studies of linguistic economy, but can be gleaned from other interface economy accounts. Interface principles of economy risk overgenerating, since the counterfactual leaves a lot of room for manoeuvre. It is very likely that a different syntactic configuration (e.g. derived by applying a syntactic operation) ends up having an effect on meaning (e.g. on structured propositions). As noted above, the usual constraint on this otherwise overgenerating idea of semantic-payoffs licensing syntactic configurations is to say that the semantic payoffs must be *uniquely* obtainable through a particular syntactic configuration or operation. Otherwise put, a logical form is uniquely obtainable if its semantic effects could not have been obtained otherwise. However, what it is for a configuration or rule to *uniquely* determine a grammatical structure is indeterminate. The recent uses of ‘unique determination’ in the two study-cases above seem to lead us to a slippery slope. Recall that the uniqueness of a structure is a relative notion: it depends on what other structures can be part of the reference set. And the structures that are in the reference set depend in turn on the grammatical transformations that can be effectively applied to build these structures. Let us pause to analyse this reasoning in more detail.

First, what are the admissible transformations that one can perform in order to reach a semantic payoff? One worry is that there are many, indeed *too* many, syntactic configurations/transformations (binding by *de se* operators, minimal changes to get natural function readings) that can bring about relevant semantic payoffs. So one problem with the very idea of economy as offering semantic payoffs when nothing else *could* is that the underpinning counterfactual can be made true in myriad theoretical contexts. If we adopt some theoretical assumptions, that payoff couldn’t be derived otherwise, but on other theoretical assumptions it could. E.g. the truth of the counterfactual varies according to whether we assume that c-command is a constraint on binding or not. One might protest that I am overstating my case on the supposition that theory-relativity is problematic. Surely, it would be nice to be able to uncover an ‘economy’ phenomenon that was not theory-relative (e.g. the original principles of binding theory were not theory-relative, or at least not to the extent the economy principles are). Still, perhaps the theory-independence desideratum cannot be met under any circumstances whatsoever, so it would be better not to dwell on this sort of consideration.

Even granting the previous point, the linguistic economy counterfactual remains objectionable. To have a better grasp of the problem, first consider constructions containing two adjuncts such as *Gigi often plays video games with his friends*, or *A nice serve with almost 200 kph*.

Different interpretations arise according to which of the adjuncts is merged (combined) first with the verb *play* in the first sentence, or with the noun *serve* in the second. Focusing on the first sentence, if the adverbial adjunct *often* is merged before the prepositional phrase adjunct *with his friends* we get a reading according to which there is a set of events that occur often, and out of this set we identify (by merging the other adjunct) those events in which Gigi plays video games with his friends. If we merge the prepositional phrase first, we get a reading on which there is a set of video game playing events involving Gigi and his friends, and by later merging the adverb, we assert that these (video game playing) events occur often. Suppose, for the sake of argument, that there is a subtle difference in meaning thanks to the two syntactic combinations.<sup>15</sup> Should we then posit that the purported difference in meaning is regulated by a principle of economy? Nothing in the way the principles of economy are usually defined prevents us from positing an economy based explanation of this purported phenomenon. I think nonetheless that the answer to the previous question is no. Whatever difference in meaning there is, it seems to be a matter of how syntactic structure (derived e.g. by the optional ‘adjunct rule of the X-bar theory) gets interpreted by the semantics/pragmatics. We need assume no economy-based feedback mechanism from semantics to syntax (or ‘look ahead’ mechanism from syntax to semantics) for the purposes of licensing syntactic forms, although, in principle, we could advance a principle of economy that covers the previous data.

Moreover, even if there is no structural ambiguity in the previous double-adjunct constructions, it doesn’t seem to be the case that we need a principle of economy to rule out one of the syntactic structures obtained by different mergers of the adjuncts. If such a structural distinction does not make sense from a semantic point of view, there is no antecedent reason to posit an interface (truth-conditional) economy principle that governs them, as such a principle would be explanatorily idle in the first place. (I shall qualify my remark about explanatory idleness below.) I think that the two points made on the basis of double-adjunct constructions generalise to almost any structural ambiguity in natural language. It seems to me worrisome that the interface economy principles are implausible with regard to these other types of linguistic constructions. The interface principles seem unnecessary when judged from the perspective of how they would generalise to other linguistic data. These shortcomings can be essentially traced back to their high expressive power and computational inefficiency (see also D. E. Johnson and Lappin 1999).

15 Indeed such ambiguities are pretty common. For instance, Carnie (2007, 178ff.) points out that in effect such a difference exists. Bromberger (2012, p. 77) proposes another similar ambiguity that easily gives rise to combinatorial explosion: *Put the book in the box on the table in the room next to the sink ...*

As intimated earlier, a possible reply to this sort of objection is that we left out important *constraints* on an economy-based solution. Consider, for instance, the economy principle that requires locality of variable binding. This principle governs the behaviour of semantically identical logical forms. But, the reply goes, there is a condition on the functioning of the economy principle, namely, one to the effect that *only* the semantic payoffs of certain types of syntactic configuration enter the domain of application of the principle. For some other types of syntactic configuration, we would get truth-conditional payoffs that are not available in case the principle is respected.

Now, the problem with economy is that the latter types of semantic payoffs—the ones that do not count—seem to be ruled out by stipulation, rather than by any principled means. Perhaps this stipulation is necessary, and hence not vicious. Perhaps these principles are really very restricted or modular. The only possible justification for these principles is surely not their elegance, conceptual motivation or generality (since, as I shall claim, all these plead against the economy principles). It is rather their empirical success in the long run that confirm the interface principles. However, given that their present applications fail more often than not—or, more neutrally put, are heavily restricted,—one may well be sceptical about these principles, if their empirical success (over a restricted set of data) is all we have to go on. To be sure, it remains to be seen if these principles will stand the test of time. My key point will be that their modularity, as well as their presumed ‘repairing’ role, lead ultimately to their being explanatorily marginal.

To illustrate the pitfalls of modularity, let us consider the original binding economy argument. Although the original argument for economy (Fox 2000) is impressive in how fine grained are its predictions, note that it does not lack a certain amount of stipulation. Here are the relevant ‘Dahl’ data, representing four interpretations of the elided construction *Bill did too*. Most theorists find the fourth interpretation impossible.

69. *Dahl’s Puzzle: one of the possible readings of the (second) ellipsis sentence is not available (ibid., 109ff) [John said he likes his mother.] Bill did too.*
- a) Bill said that John likes John’s mother. (strict, strict)
  - b) Bill said that Bill likes Bill’s mother. (sloppy, sloppy)
  - c) Bill said that Bill likes John’s mother. (sloppy, strict)
  - d) \*Bill said that John likes Bill’s mother. (strict, sloppy)

The truth-conditional economy account assumes that, in the first sentence of the Dahl puzzle configuration (69), the pronouns are bound, whilst in the ellipsis sentence we can get coreference by Parallelism. However, there is a tension between Binding Economy (bind



closest) and Parallelism. This can be easily seen from the statement of Parallelism: impose a structurally isomorphic logical form, that is, impose the same binding relation or the *truth-conditionally equivalent coreference* configuration in the ellipsis sentence (see Fox 2000, pp. 115-6). But by simulating the binding relation in the first sentence *via* a coreference relation in the ellipsis sentence we implicitly assume that Parallelism doesn't comply with Binding Economy. The truth-conditional economy advocate might reply that this is in fact the case, and there is nothing to do about it.

However, a question arises as to why the tension is solved in favour of Parallelism. Why is Binding Economy trumped by other principles? The suggested answer is that economy is modular; it targets a very restricted set of syntactic configurations. As we suggested, this is similar to considering economy as a repair strategy, since it comes down to saying that the interface economy patterns are the exception rather than the rule. Otherwise put, interface economy principles have a small domain of application, and can be trumped by other grammatical principles (and sometimes by pragmatic factors as well).

In a nutshell, from an explanatory perspective, empirical adequacy is preserved at the expense of generality and other epistemic virtues such as simplicity, computational efficiency and non-*ad hoc*ness. Nevertheless, there should be a trade off between empirical adequacy and other epistemic virtues. Even if many epistemic virtues are said to reside in the eye of the beholder, we should not miss the general pattern in the explanatory uses of economy. In the recent generative linguistic history, as theoreticians seek to find new applications of the interface economy principles, these principles are increasingly pressed into taxing the elegance and naturalness of the linguistic explanation. More direct evidence for the interface principles does not seem to be forthcoming. Instead, new theoretical posits (e.g. insensitivity to certain semantic outputs) are needed in order to secure the applicability of such principles. It appears that this dynamics basically leads to the explanatory marginality of the interface principles of economy.

To sum up, there are two weak points of truth-conditional economy: its notion of sensitivity to semantic payoffs and its reliance on a counterfactual conception of what it is to create such payoffs by other grammatical means. Regarding the latter, there are many ways of counterfactually considering grammar so as to achieve semantic payoffs. But then, the limits of what is counterfactually possible are fixed by stipulation (be it theory-internal or not, vicious or non-vicious). Regarding the former, the 'deus ex machina' character of economy principles—the fact that they sporadically miss semantic payoffs—conceals the major problem, which can ultimately be traced back to their high expressive power. A serious concern is the at least apparent *ad hoc* character of the economy-based explanations in the above study-cases. Their stipulative character paired with the actual

marginality of the explanatory role of economy should make us wary of considering them real linguistic constraints. (Later on, I shall argue that the good predictions of the most successful truth-conditional principles can be obtained by other means.)

Before going any further, it's important to be clear about the nature of the case I am making. My sceptical argument is conceptual rather than empirical. Meanwhile, it seems reasonable to assume on empiricist grounds that 'covering' data is the main purpose of a linguistic hypothesis, and thus that the theoretical usages of economy principles are generally beneficial as long as they do their empirical job. There are very compelling arguments for economy (e.g. Fox 2000) and this invites us to take them seriously. From this (empiricist) standpoint, what I have to say against economy principles has limited force in the absence of better alternative proposals for explaining the relevant phenomena. In fact, I shall propose an alternative in the next chapter, but the reason for suspicion still stands even in the absence of an alternative.

There is something to be said in favour of a *coherent motivation* for the linguistic mechanisms posited, however good they are in covering certain data. For it may turn out that the empirically adequate proposal is just a brute force regimentation of descriptive claims about the linguistic phenomena under investigation or an unprincipled coverage of the data. I think that it is in this latter respect that the theoretical uses of economy fall short. My principal claim is that there is *no* coherent and natural motivation for the uses of economy, for their role in the general architecture of the grammar. This is clear from the two study cases: the first study-case takes economy to be modular, whilst the second invokes some sort of pragmatic motivation (although it is not obvious what the communicative role of the latter is). As their underlying rationales are not well-developed, these two takes on linguistic economy may not even be opposed. Be that as it may, this reinforces the point that we don't have a consistent view about the role of economy in linguistic theorising.

So, in essence, we ask why there should be interface principles of economy (i.e., principles of economy at the interface between syntax and semantics), and for what purposes. What is the theoretical purpose of positing economy mechanisms? It serves our theoretical purpose of understanding language to have a clean and unified idea of what economy principles can do for us. It seems that there is no good rationale behind the interface principles.

The key point is that the usage of economy-principles is not consistent across the discipline,<sup>16</sup> and that this is a problem if we take as adequacy criteria some respectable ideas behind the original economy-principles. As we have seen, their motivation was (at least in part) *semantic and pragmatic*, and their goal was to confer generality as

<sup>16</sup> It is hardly my intention to argue that any particular theorist is being inconsistent.

well as explanatory ‘naturalness’ upon linguistic theory, and specifically upon binding theory. The unnoticed drift away from both such motivations is conceptually unfortunate. Whilst this may not affect much the particular accounts that underlie the previous case studies (concerning essentially *de se* pronouns and copular sentences), the ‘marginal utility’ or explanatory fruitfulness of binding economy principles is decreasing.<sup>17</sup> At least some of the empirical results provide no basis for thinking that linguistic economy is a property of grammars.

### 3.4 CONCLUSION

One may wonder how strong my conclusions are, and whether they do not rest on a biased selection of the set of linguistic economy accounts that served as my study cases. My answer, in brief, is that there is no selection bias on my part, because the latter set of problems (including e.g. the ‘counterfactual’ problem) is a more general one, and the case studies are well chosen. To start with the latter point, the two case studies have been selected so as to have a representative application for each of the two standard principles of economy (developed by Fox 2000 and Reinhart 2006 respectively). While these applications are admittedly marginal in the respective theories of *de se* pronouns and connectivity in copular sentences, they are not at all marginal for a purported theory of linguistic economy. Therefore, I take my sample selection consisting of the two extensions of the standard economy principles to be representative of the problems that I highlighted.

I would also speculate that the problems I uncover are representative of a larger trend in interface economy explanations. The trend is that, over time, these principles have become explanatory marginal. They become explanatory marginal because they seem to intensify the limitations of the original principles, e.g. by failing to meet the pragmatic and generality desiderata. More broadly, the reasoning behind interface economy—to the effect that certain syntactic properties depend on semantic ones—almost invites further stipulation in order to align syntactic and semantic constraints, which usually pull in different directions. Of course, I cannot rule out with absolute certainty interface economy principles, since I have not evaluated all the extant economy principles, let alone the possible ones. However, I think that my objections apply very widely, and so it remains to be

<sup>17</sup> I acknowledge that science is opportunistic, and thus that the marginality of some uses of the principles is not necessarily a problem. However, it is also true that the economy-principles governing binding have been deployed to do patchwork for purposes different from better understanding binding. The economy-principles are deployed as ‘theoretical repairs’ for accounts that targeted phenomena that interact with binding but are not primarily about binding (*de se* pronouns, connectivity).

seen whether a different, success story can be told about the interface principles of economy.

The negative emphasis should fall here on the *interface* and *truth-conditional* character of economy, rather than on the idea of economy itself. I propose a different view of economy that does not depend on back-and-forth informational exchanges between syntax and semantics. The general change in perspective that emerges from the present discussion goes along the following lines. By giving up truth-conditional economy we get two important improvements. Firstly, as the computation involved in comparing grammatical forms is costly, avoiding some such economy mechanisms will take some pressure off the interface between syntax and semantics. Relatedly, we also eschew the proliferation of vacuous competitions with competitors ‘failed’ for unknown (non-semantic and non-pragmatic) reasons. As suggested, the principles of economy are often *ad hoc* devices whose epistemic function is, in practice, to fix a linguistic account. By positing a pragmatically motivated economy computation, we also keep away from these *ad hoc* theoretical moves, and, as I shall argue, shed light on phenomena that were previously unexplained on the binding theoretic view.

Thus, I shall henceforth assume that there is need to improve the linguistic economy explanatory schemas in a way that is consistent with the methodological preference for elegance, generality, and other epistemic virtues. We have to restore the original foundational role of economy principles to benefit binding theory more generally. I see two ways to improve on the standard binding theory by giving pride of place to economy considerations: either seek to build the economy-based account on syntactic principles (Reuland 2011; Safir 2004) or build the relevant economy-principles in the semantics (Andy Kehler 1993; Schlenker 2005). Both of these solutions are advantageous partly because they are not based on interface principles, which require, as we have seen, complex mechanisms that are not methodologically motivated. For reasons that will be discussed, I endorse the latter, semantic-based economy account.

In the next chapter, I develop a semantic account of binding, which has a more natural pragmatic motivation. This semantic/pragmatic account will be showed to fare better with the two desiderata put forth in this chapter. I shall also show, *inter alia*, how this semantic/pragmatic account can deal with the phenomena in the two study-cases discussed above, namely, with the binding of *de se* pronouns and the binding patterns in copular (pseudo-cleft) sentences.

## 4 | A SKETCH OF A SEMANTIC ECONOMY ACCOUNT OF BINDING

### 4.1 BINDING ECONOMY

In the previous chapter, I showed that the application of economy principles has become overly complicated and explanatory marginal and that the generality with which the initial principles of economy were endowed is now absent. Next, I develop an alternative binding theory based on a local, semantic principle of economy. This chapter completes the wider argument of the first part of the thesis for economy principles that are better motivated pragmatically and more general than the extant ones. It is not my task to offer an empirical demonstration, and only a weak claim of empirical adequacy is being made. Rather, I would like to present conclusive evidence for the superiority of the semantic denotational economy account over the interface economy accounts. A secondary, but not less important, aim is to make a case for a more general theory of binding based on economy considerations. I shall put forward an account compatible with the empirical findings about binding, and, in particular, with the main generalisations of the traditional binding theory.

In developing the semantic economy account of binding, I shall make use of a set of data—the ‘binding economy’ data in §4.2.1—which will be instrumental in laying down the main assumptions of the account (in §4.3). In §4.4 I show how this account can deal with *de se* and copular constructions, which, as argued in the previous chapter, are problematic for the standard economy accounts. I thereby show the superiority of the semantic economy account relative to the standard (interface, truth-conditional) economy accounts. I conclude by outlining the view of binding on the semantic economy account and discuss several lines of response to some challenges facing the semantic economy account.

### 4.2 SEMANTIC-BASED ECONOMY: MAIN ASSUMPTIONS AND DATA

There are several alternative approaches to the traditional binding obviations (see below), which include the truth-conditional economy view (Reinhart 1983a, 2006), the denotational economy view (Andy Kehler 1993; Schlenker 2005), and the syntactic economy view (Safir

2004). It seems to me that the syntactic and denotational accounts share an important explanatory assumption,<sup>1</sup> but, in the interest of space, I shall not adjudicate between the two accounts, and leave this comparative study for another time (see also fn. 4). The latter is more in line with our pragmatic desideratum, for reasons that will soon become apparent. I shall focus on the comparative merits of the denotational principle and the more familiar truth-conditional principle.

The truth-conditional and denotational economy principles are similar in that they involve a *comparison*—or, more neutrally, a *ranking*—of linguistic forms according to semantic criteria. But the two types of principles differ in important respects. Essentially, the former is conservative with respect to binding theory, whereas the latter, in a specific sense, is not. I advocate the latter for two basic reasons.

Denotational economy (or, equivalently, semantic economy) satisfies the two methodological desiderata implicit in the original account of binding in terms of economy. It is (i) a more general account that gives a more central place to economy considerations, and (ii) is pragmatically better motivated. By embracing denotational economy we eschew the problems encountered in the two case studies earlier. In this chapter I shall argue for the two claims. I will show that our preferred denotational economy account ranks better regarding the second, ‘pragmatic’ desideratum, and make a case for the more ambitious claim that our account meets the first desideratum to the effect that an economy-based approach should provide a *general* account of binding. With regard to the main data, I shall discuss—from the denotational economy perspective—several binding patterns that are problematic for the Conditions A, B, and C of binding theory. I shall also look at logophoric pronouns, *de se* pronouns, and connectivity effects, thus revisiting, from a new theoretical perspective, some of the examples presented in the two study-cases of the previous chapter.

It bears repeating that I won’t provide a *theory* of binding or even of some aspect of binding. My approach will be mainly *descriptive*. I shall reshape some of the basic assumptions of the extant denotational economy account of binding, and show that the ensuing picture has a certain degree of unity—a feature lost on the competing, truth-conditional accounts. As I stated in the last chapter, my conviction is that there is no reason to split binding theory in two halves, one in the syntax and one at the interface with semantics/pragmatics, and this chapter is meant to support this idea. Additionally, I shall provide a useful semantic typology for noun phrases that can be used as a tool in approaching binding phenomena. I shall show how to integrate within the semantic-based framework both the well known and the less well known data which do not fit well (if at all) with

<sup>1</sup> See Nasta (2013) for a sketch of the main mechanisms underlying the syntactic and denotational accounts

the traditional binding theory. I shall insist that this framework is based on general and conceptually appealing ideas, and that it can also make sense of the problematic data.

#### 4.2.1 Binding economy data

Let us review the core empirical data. The principal empirical motivation for economy principles comes from considering a few problematic cases. In particular, we need to articulate an account of the following sort of examples involving binding patterns that resist incorporation into the traditional (non-economy-based) binding theory.

70. *Principle A violations: a reflexive is not bound in its domain, contrary to Condition A*

- a) When the Yankees accept the trophy, *Jeter* will represent *them*. (Safir 2004)
- b) Ringo saw his likeness in the wax museum. *He* considered *himself* very impressive. (Jackendoff 1992)
- c) This paper was written by Ann and myself. (Kuno 1987, p. 119, credited to Ross)
- d) Physicists like myself/\*himself are a godsend. (adapted from *ibid.*, p. 123)

71. *Principle B violations: the pronoun is not free in its domain, contrary to Condition B*

- a) Oscar trusts nobody. — Not exactly, Oscar trusts *him*. (Safir 2004)
- b) I know Tully, and I'm sure *that guy* is *him*/\*he. (*ibid.*)
- c) (Everybody hates Lucifer.) Only *he* (himself) pities *him*. (Heim 1998, p. 212)
- d) (Is this speaker Zelda?) *She* praises *her* to the sky. *She* must be *her*. (adapted from *ibid.*, p. 213)
- e) (You know what Mary, Sue and John have in common?) Mary admires John, Sue admires him, and *John* admires *him* too. (*ibid.*, p. 216)

72. *Principle C violations: the proper name is not free, contrary to Condition C*

- a) Everyone hates Oscar. Even *Oscar* hates *Oscar*. Safir (2004)
- b) *Cicero* turned out to be *Tully*. (*ibid.*)
- c) *He* is *Ralph*. (Reinhart 2006)
- d) *The Yankees* believe that *Derek Jeter* will be the difference in the series. (Safir 2004)



These examples are important because they resist incorporation into the binding theory, and otherwise general theory supported by very robust data. I pointed out in the previous chapter that sentences such as *John likes himself* should get covalued noun phrases (noun phrases having the same referent), whereas sentences such as *John likes him* and *He likes John* should not get covalued noun phrases. These sentences are the basic data of binding theory; they are subject to the binding principles A, B, and C respectively. These core data are very robust and can be multiplied, making the traditional binding theory a descriptive hypothesis whose generality the more recent accounts should preserve.

However, as emphasised by the examples above, we get sameness of reference and disjoint reference precisely where we don't expect them according to the traditional binding theoretic view. For instance, in (70b) the pronoun *he* refers to Ringo whilst the reflexive *himself* refers to the wax statue of Ringo. In other words, we get disjoint reference where Principle A of binding theory leads us to expect sameness of reference. A further counterexample to binding theory is given in (71a). Contrary to Principle B, *him* refers to Oscar, so we get sameness of reference where we should get disjoint reference—on the binding theoretic view, the pronoun *him* should not be bound by *Oscar* and thus should be free. Similar problems occur with Principle C, which is supposed to disallow sameness of reference between proper names and other c-commanding phrases. Nevertheless, we do get sameness of reference in (72a) where the two occurrences of *Oscar* clearly refer to Oscar.

It should be noted that these are not the only challenges faced by binding theory. These challenges have been singled out because they can, in my opinion, receive a unitary treatment. To meet these challenges, I make use of the denotational economy account, which I assimilate to a long linguistic tradition that attempts to explain binding phenomena in a semantic/pragmatic setting.<sup>2</sup> I shall build a more general principle of economy based on the denotational economy account. I start with some minor modifications which increase the empirical adequacy of this account.

#### 4.2.2 Semantic economy: main assumptions

Traditional binding theory sought to account for coreference patterns among noun phrases by keeping the (admittedly minimal) notion of reference fixed, and fiddling with syntactic conditions on the binding domain and indexation. It also imposed a strict distinction between

<sup>2</sup> Reinhart (1983b) is acknowledged to be one of the first exponents of the pragmatic tradition. Although we could say that denotational economy account is part of the 'pragmatic' tradition that started with Reinhart (1983a), the denotational economy account will push its principles further to the semantic/pragmatic interface.

syntactic and discourse binding. Instead, I am trying to account for coreference patterns by keeping syntactic conditions as simple as possible, and by making appeal to a richer notion of reference. This also involves relaxing the divide between semantic and discourse binding.

I shall draw on the framework proposed by Schlenker (2005) (see Andy Kehler 1993 for a similar account). The resulting economy account rests on three general assumptions.<sup>3</sup>

73. *Fregean guises*. I generalise the notion of guise from individual guises (or concepts)  $\langle s, e \rangle$  to guises of other types. The economy principle will be defined on such guises.
74. *Antecedence*. I appeal to a broader notion of antecedence, which goes beyond the boundary of the sentence. By antecedence, I shall understand sentential as well as non-sentential (or covert) antecedence.
75. *Semantic economy principle*. A unique principle of economy, *Non-Redundancy*, regulates the referential dependencies between noun phrases.

The ideas underlying Schlenker's account can be subsumed to a traditional view according to which binding theory is to be reduced to two principles: one geared towards identity of reference and the other geared towards disjoint reference (see Kuno 1987, ch 1 for a review of the traditional view). However, I prefer Schlenker's account because it is more elegant and his applications of denotational economy are better developed (and up to date) than the original accounts. Schlenker argues that binding theory can be reduced to a principle he calls *Non-Redundancy*, under several additional plausible assumptions.

Notably, it is primarily Non-Redundancy that makes our semantic (or denotational) account an *economy*-based account. The semantic account that will be provided is, strictly speaking, a hybrid account, since it makes use of two other crucial assumptions (concerning antecedence and guises) which do not involve economy but are necessary to get the denotational economy account off the ground.

The denotational account posits that the referents (guises) that are the semantic values of expressions capable of entering a binding relation as well as the referents salient in the background (the speaker and hearer) are arranged in a *linear sequence*. Constraints on referential dependencies are then constraints on the form the linear sequence can take, and on the ways it can be updated. The sequence is, broadly

<sup>3</sup> The third assumption, Non-Redundancy, is, to my knowledge, original to Schlenker's account. I'm not sure whether Schlenker endorses the second assumption (Antecedence), although it seems to me that he should (see also fn. 15). In any case, the first two assumptions—Fregean guises and Antecedence—are more common in literature.

speaking, a semantic object, and thus can be constrained by semantic and pragmatic principles. On the denotational account, the main constraint on the sequence of evaluation is Non-Redundancy:

76. **Non-Redundancy** No object may occur twice in the same sequence of evaluation. (Schlenker 2005, p. 6)

Schlenker (*ibid.*) introduces a new indexing notation that works better with the sequence-based account of binding. The basic idea of the indexing notation is that potential bindees (anaphors, broadly speaking) bear indices which indicate the place of their (binder) referent in the sequence of evaluation. For instance,  $he_{-1}$  depends referentially on the referent in the first slot, counting from right to left,  $he_{-2}$  depends on the second referent, and so on. The binding is effectively produced by pulling these (binder) referents from their initial position into the last slot of the sequence (which is a position newly created). Thus, in the sentence “John told Bill that  $he_{-1/-2}$  should leave,” if the pronoun’s index is  $-1$ , it will be anaphoric on *Bill*, and if it bears index  $-2$ , it will be anaphoric on *John*. The initial state of the sequence can be represented as  $\langle j, b \rangle$ , and after binding is effected the sequence becomes, e.g.  $\langle \#, b, j \rangle$ . This latter sequence represents the construction in which the pronoun (bearing index  $-2$ ) is bound by *John*, and thus the referent  $j$  (standing for John) is pulled into the last position in the sequence. From now on, in analysing linguistic constructions, I shall leave this notation implicit, but it is important to note that this is the mechanism underlying binding on the denotational economy view.

Non-Redundancy has an unmistakable economy flavour, since it is aimed at prohibiting semantic redundancy. But, in my view, part of the economy character of Non-Redundancy derives from its making use of a *ranking* between linguistic forms, and, in particular, noun phrases. The ranking of linguistic forms from more specific (less dependent) to less specific (more dependent) should ultimately rely on the presuppositional and assertoric content (or feature-content) of NPs. To complete the denotational economy picture of binding, we must ultimately say how the semantic contents of noun phrases can be ordered. Non-Redundancy will be sensitive to the ranking of noun phrases. For instance, proper names will be ranked higher than pronouns in terms of specificity (or referential independence), and pronouns, in turn, will be ranked higher than reflexives.<sup>4</sup> I won’t try to

<sup>4</sup> It is worth stressing that I deviate in important respects from Schlenker (2005). I shall have the occasion to make clear the main points of divergence. To begin with, Schlenker does not explicitly mention any *ranking* between noun phrases, but I think that this is implicit in the way he conceives of pronouns, reflexives and full noun phrases in his account. By way of his assumptions about indexing on pronouns, the semantic role of reflexives (as arity reducers) and proper names (as always introducing their referent at the end of the sequence), Schlenker arguably imposes a ranking on noun phrases. This suggests that the original denotational

spell out what's involved in this ranking, and leave it at an intuitive level.

To illustrate an application of Non-Redundancy, consider the (70a) example *When the Yankees accept the trophy, Jeter will represent them* and (72d) *The Yankees believe that Derek Jeter will be the difference in the series*. Contrary to the naive predictions of BT, there is an overlap in reference between the proper name *Jeter* and the plurality to which the noun phrases *them* and *the Yankees* refer. This is because, let us assume, Jeter is part of the Yankees' team, and thus by referring to the latter, we automatically refer to Jeter. The referential overlap between Jeter and his team is problematic on the grounds that coreference is explicitly disallowed by binding theory (in the configurations specific to the above examples). We can deal with this problem in a way compatible with denotational economy. Since the noun phrases refer to pluralities whilst the proper names refer to non-plural entities, the referents in the sequence of evaluation contributed by proper names and the plural noun phrases will be different. This is sufficient to ensure that Non-Redundancy is not violated.<sup>5</sup> The remaining examples pose more serious problems, and have more general consequences for an account of binding. I turn now to these examples, dealing with the principle A, B and C cases respectively. In the subsequent discussion, I shall utilise the binding economy data as a tool for introducing the crucial assumptions of the denotational account, and once these are in place, I shall go back to the two case studies introduced in chapter 3. My main task is to show how we can deal with these and other problems within the denotational economy framework.

### 4.3 EXTENSIONS OF ECONOMY

I put forward my version of the denotational economy account. For terminological variation, I shall call this account *denotational economy* or *semantic economy*. In developing the denotational economy account under the strictures of binding economy data, I will need to make some minor, but necessary, revisions to the assumptions of the original account (e.g. the assumption that reflexives are arity-reducers).

---

economy account is not far from other proposals that are revisionary with respect to binding theory. So, for instance, Levinson (2000) advances a pragmatic account that posits a similar ranking between noun phrases, and Safir (2004) finds that the source of such a ranking is in the syntax. It would be interesting to bring these strands of thinking together, and try to unify them. It is essential for such a project to say what specific properties of noun phrases are at the basis of such a dependency or specificity ranking. I hope to be able to do this in future work.

- <sup>5</sup> To be sure, a similar strategy can be adopted within the traditional binding theory. No matter which framework one adopts, note that there still remains to be explained how to obtain the intuitive overlap of reference between pluralities and individual referents. Since I am mainly interested in the basics of binding, I leave this explanatory task on accounts of plurality, but see Schlenker (2005).

This will ultimately lead us to an elegant typology of the denotations involved in the binding data considered here including the data in §4.2.1 and those in the two study-cases (see the conclusion). The modifications of the original denotational economy account are in great majority based on assumptions or theoretical hypotheses that can be found elsewhere in the literature. I pull these assumptions and hypotheses together, since they allow for the most elegant treatment of the data under consideration, a treatment which is importantly in accord with our desiderata (viz. generality and pragmatic support).

#### 4.3.1 Extended Non-Redundancy

It would be convenient to start with the examples that are subject to the binding condition B. In particular, there are two general linguistic patterns that I want to draw your attention to. To begin with, the binding economy data include examples where some object passes as a proxy for an agent, and is referred to as if it were that agent herself. These are the so called wax museum (or Madame Toussaud's) cases. My first point is that the wax museum examples are relevant for the use of pronouns, and not only for reflexives. It is clear that in a wax museum setting, a reflexive cannot be replaced by a pronoun, preserving the sameness of reference (marked here by coindexation).

77. \*[Ringo saw his likeness in the wax museum.] Ringo<sub>i</sub> admired him<sub>i</sub>.

The behaviour of pronouns in wax museum cases requires an explanation compatible with the explanation offered for the original wax museum example (70b), *Ringo saw his likeness in the wax museum. He considered himself very impressive.* To anticipate, on the account I will be arguing for, the example (77) is unacceptable because in the wax museum scenario, the two binding expressions (i.e., the expressions potentially entering the binding relation, *Ringo* and *him*) have the same guise as denotation. This violates the original condition B, or the semantic restatement of this condition in terms of the denotational economy principle, Non-Redundancy—the pronoun *him* introduces the same guise in the sequence of evaluation, which yields redundancy (and thus ungrammaticality).

Secondly, I make a generalisation of the denotational economy account in order to incorporate the Principle B obviation in (71e). The example runs as follows: *You know what Mary, Sue and John have in common? Mary admires John, Sue admires him, and John admires him too.* Note that this sort of example is not readily accounted for with the machinery assumed by the denotational economy account, and in particular by appeal to individual concepts or guises. If we take the example at face value, no appropriate guise can serve as semantic value for *him*. For we need a guise that differs from the guise of John (the

mental file for John kept in the long term memory), and the context does not seem to provide us with the required guise. The Principle B obviation can nevertheless be explained by Non-Redundancy. To see how, we need to generalise Non-Redundancy so as to cover not only the sequences of semantic values of referential (or plural) noun phrases but also sequences of semantic values of *more complex* grammatical categories. A natural extension of denotational economy is to apply it at the level of structured properties and propositions, that is, to expressions that can take structured meanings as semantic values. The effect of the generalised Non-Redundancy will then be to disallow two identically structured meanings in the same sequence.<sup>6</sup>

However, in some contexts where there are pragmatic reasons to draw a contrast, it is possible to obviate (generalised) Non-Redundancy. This is the case with (71e). (The same strategy is needed for Principle C obviation of the type *Oscar likes Oscar*—see §4.4.2 for discussion.)

Outside such contexts, there is no question about structured meanings, and Non-Redundancy will rule them out. On the hypothesis that Non-Redundancy applies in non-contrasting cases as well, we predict that it should rule out sentences whose logical form is  $p \wedge p$ ,  $p \rightarrow p$  etc., assuming  $p$  expresses the same structured proposition in these contexts. This semantic/pragmatic generalisation seems on the right track, since utterances with those logical form in natural language do seem infelicitous, due to manifesting redundancy. Only in economy-configurations, which involve differently structured propositions or properties, are repetitions allowed; see e.g. (78g)-(78h). Other sentences that violate (the revised version of) Non-Redundancy are the following.

78. *Non-Redundancy Violations* (cf. Maxim of Manner, Grice 1967/1989)

- a) ??I believe that Kent is smart and that Kent is smart.
- b) ??John has two firms in Bucharest and one firm in Bucharest.
- c) ??If John dances, he dances.
- d) ??After John turned the key, John turned the key.
- e) ??Are you leaving or not staying?
- f) ??A blond and fair haired woman.

6 I'm building here on a suggestion by Heim (1998, 212ff). For Heim, guises are individual concepts, i.e., functions from worlds to individuals. Moreover, Heim appeals to what she terms *structured propositions* rather than guises. It is clear from her paper that Heim does not suggest that we should adopt two distinct metaphysical positions regarding the semantic values of noun phrases and more complex expressions, respectively. So my proposal is a terminological variation on Heim's. A uniform notion of guise which further ramifies into individual and complex guises is terminologically and conceptually natural. I thus adopt a unique notion of guise, and extend it from semantic values of type  $\langle s, e \rangle$  to more complex types. Various other extensions will be needed for other purposes. For instance, see Schlenker (2005, pp. 48-9) for an extension in a different direction of the notion of individual guise that is required to deal with problems related to quantifier binding.



- g) <sup>OK</sup>John kissed Mary, and Mary kissed John.  
 h) <sup>OK</sup>If John loves him [=John], John loves himself.

The cases (78a)–(78f) are problematic because they involve redundancy. For instance, (78b) offers no communicative advantage over a non-redundant utterance to the effect that John has three firms in Bucharest. Similarly for (78d): a simpler way to express the same thought would be to say John turned the key twice. To be sure, pragmatic reasons for uttering some of these sentences can be given. It seems that we can draw a clear distinction between the (78a)–(78f) cases and the (78g)–(78h) cases, in the sense that the latter present us more clearly with differently structured semantic values that are likely to have pragmatic import. In (78g), for example, the two kissing events are differently structured. (In case Mary forcibly kissed John, we would not say that John kissed Mary.) In virtue of the differently structured meanings, it is felicitous to report an essentially unique kissing event using (78d). <sup>7 8</sup>

Such cases can be explained by appealing to a broadly Gricean view, by utilising something along the lines of the Maxim of Manner. This principle prevents the speaker from making his message more difficult than it has to be. In other words, this pragmatic maxim requires that, if the semantic/pragmatic content is kept fixed, the form of expression communicating that content should be simpler rather than more complicated. However the point here cannot be that these constructions' behaviour is due to a pure principle of semantic competence. Rather, we can see Non-Redundancy as being partly a semantic rule and partly a pragmatic one. Thus, Non-Redundancy seems to be, at least in the core binding cases, the Maxim of Manner (or a similar pragmatic principle) grammaticalised.

How does the Non-Redundancy economy principle effectively come to deal with the more complex guises? In short, the economy principle works as follows: when an apparent violation of binding theory (and, specifically, of Non-Redundancy) occurs, the interface first checks whether there are guises of binding expressions, e.g. guise-valued pronouns, that could 'save' the LFs, and if there are none,

<sup>7</sup> Schlenker (2005, 19,20 fn. 21) posits, for different reasons, that propositions should appear in the sequence of evaluation.

<sup>8</sup> As Paul Elbourne (p.c.) suggested, an immediate problem for the view that Non-Redundancy governs more complex meanings (properties and propositions) is that VP-ellipsis seems to introduce a redundant semantic value in the sequence of evaluation. However, it is not clear that we need to say that the elided phrase introduces a new semantic value in the sequence. In fact, we have independent reasons to think that it does not. A well-known account of VP-ellipsis has it that VP-ellipsis is a form of anaphora, and takes elided phrases to depend anaphorically on previously introduced verb phrases Hardt 1999; Andrew Kehler 2002. From the perspective of the present account, this view is very appealing, since it entails that elided phrases inherit the semantic values of previously introduced phrases, thus avoiding redundancy (as desired).



more complex guises are looked for, i.e., guises for properties expressed with the constituent pronouns. These complex guises can be deployed only if there is an explicit communicational point (e.g. a certain contrast to be drawn or a similarity to be highlighted), in accord with our second, pragmatic desideratum (and in contrast with past uses of the interface economy principles).<sup>9</sup> So, the linguistic restriction on the (78) cases receive a clear pragmatic motivation.

#### 4.3.2 Against arity-reducers

In order to accommodate the principle A effects, Schlenker (2005) assumes that reflexives will be treated as reducing the arity (i.e. the number of arguments) of the verb. In this way, Schlenker succeeds to account for reflexives without assigning them individual semantic values which fall under the incidence of Non-Redundancy. In effect he rules out principle A (and reflexive pronouns) from the domain of Non-Redundancy.

In what follows, I shall focus on some of the challenges for the arity-reducer (or ‘reflexiviser’) account of reflexives, and provide a more orthodox solution that, in addition, preserves the main assumptions of the denotational economy account.

##### *Against the arity-reducer analysis of reflexives*

The denotational view is formulated in terms of an arity-reducer view of reflexives. This simplifies, in some sense, the account of the principle A effects. Instead of considering that a transitive verb with a reflexive object takes two arguments (with two semantic values that should be non-redundant for economy reasons), this account has it that the reflexive in question reduces the arity of the verb and hence the verb ends up taking only a single (semantic) argument. For instance, the verb *love* in *Sally loves herself* will become *self-love* after combining with the reflexive. The arity-reduced verb—*self-love*—takes only one argument, namely Sally (or the corresponding guise-valued meaning).<sup>10</sup>

<sup>9</sup> We can check the plausibility of complex guises by embedding sentences in intensional contexts. Thus, someone may well believe that John loves him [deictically picking out John], without believing that John loves himself. The two properties instantiated by John are different in those belief-worlds.

<sup>10</sup> Some theorists—e.g. Buring (2005, p. 22) and C. Collins and Postal (2012, p. 19)—have pointed out that there are reflexives that do not correspond to logical arguments. Consequently, in sentences involving such reflexives, no relation between individuals is being expressed, but rather a unique property that the subject satisfies. It is important to note that these cases are special, and involve only verbs like *behave*. (These can be analysed either as involving a form of inherent reflexivity or as requiring arity-reducing reflexives.) We can grant that some verbs require an arity-reducer analysis of reflexives, as long as this is not generally the case. In fact, these verbs are the best case one can make for the arity-reducer approach. However, we see no reason to assume that all the verbs are of this type.

A problem with the current account is that the assumed view of reflexives cannot make sense of Madame Tussaud ('wax museum') constructions, that is, examples like *Ringo saw his likeness in the wax museum*. *He considered himself very impressive*, or *Ringo fell over and crushed himself*. (These examples were first brought to light in connection to binding theory by Jackendoff 1992.) A context-aware account of the wax museum cases should be consistent with the fact that the utterance is made about two distinct individuals, since, after all, there are two individuals in the envisaged scene. But on the arity-reducer view, the unary predicate *self-consider impressive* can only be predicated, by definition, of a unique individual, rather than two. Consequently, it is hard to see how this view is supposed to handle such cases in a way that does justice to the pragmatics of the wax-museum scenario.

However, by adopting the previous theoretical assumptions, it is possible to provide an elegant alternative. The wax museum examples would need an account in terms of guises, which proved to be effective in handling pronouns and full noun phrases (viz. definites and proper names) in Condition B and C configurations—several such configurations will be further discussed in §4.4. In order to vindicate principle A under the denotational economy account, we must be able to say that the referent of *Ringo* and the entity referred to by *himself* (the wax statue) are represented, in a sense, by the same entity, a guise under which actually different referents are given. They are both represented as, say, a Ringo-like guise. The Ringo-like guise is both a guise of Ringo himself and of his wax statue.<sup>11</sup>

We could implement this idea by considering that guises are functions that pick out individuals that meet some (contextually variable) standard of similarity. Then, Ringo and his statue will be assumed to meet the relevant standard of similarity. Adopting some basic ideas from situation semantics, we could say that the context of utterance of the wax museum constructions make available two situations, formed from two individuals (Ringo and the statue) and their properties (including the relational property of similarity), and the similarity-based guise yields at each such situation the individual of that situation in virtue of the similarity relational property that that individual possesses.<sup>12</sup> If this is on the right track, we should give up the arity-reducer account of reflexives and say that the condition

11 Assuming that our guises are similar to what Frege meant by senses, we need to give up the Fregean contention that sense determines reference, because on the present view it is possible to have expressions with the same sense (guise) but different referents.

12 This application of situation semantics differs from the standard applications in Elbourne (2013) and Kratzer (2014) in allowing relational properties (rather than simply non-relational properties) to be constitutive parts of situations. However, it seems to me that such a relational property, however vague or abstract it might be, is needed to deal with the wax museum cases, and also has some intuitive pragmatic appeal in such cases.

A is validated by the existence of the same similarity-based guise for distinct individuals. This solution is attractive since it gives up a theoretical posit (about arity-reducers), and extends the use of previously assumed machinery.

Reflexives will function differently according to a semantic economy account that does not assume the arity-reducer view. Reflexives will pull the ‘referent’ with the requisite person and number features out of its position in the sequence of evaluation.<sup>13</sup> This referent should take the form of a similarity-based guise. We thus should first get in the sequence the guise as the semantic value of *Ringo*, and then move it to the end of the sequence when the semantic value of the reflexive needs to be introduced. For now, I assume this guise is given contextually, and gloss over details about how this guise is effectively produced.

Apart from the wax museum cases, there is further motivation for giving up the ‘reflexiviser’ (arity reducer) analysis. Another problem with this view is that, sometimes, reflexives and self-expressions have different properties. Consider the following contrast, noted in Williams (2003, p. 100):

79. Stories about the destruction of oneself can be amusing.

80. Self-destruction stories can be amusing.

The sentence (79) (also) admits the reading in which the agent of destruction (the destructor) and the object (the theme or patient) of destruction are different individuals, but this is not so for (80). In other words, the interpretation of (79) is compatible with the existence of two individuals satisfying the role of agent and object of destruction, respectively. In contrast, the only interpretation of (80) is that in which the destructor and the person who is destructed are the very same person. If the arity-reducer view is intended as a general view of reflexives, this contrast needs explaining. That is, if the claim is that, in general, reflexives reduce the arity of expressions they combine with, why don’t they reduce the arity of verbs in nominalised form?

Relatedly, Safir (2005, p. 123) points out an important difference between constructions like *he dressed* and *he dressed himself*. In the former construction presumably the verb *dressed* should be interpreted as *self-dressed*. Yet, only the latter construction—the one containing a reflexive rather than a self-verb—can be felicitously used in a wax museum scenario to refer to distinct individuals. Meanwhile, on the arity-reducer view, there is no specific difference between the two types of verbs; on a natural extension of the view, they will both be

<sup>13</sup> I assume, to a first approximation, that the positions in the sequence are c-commanding positions, i.e., for every pair of referents in the sequence, the left referent c-commands the right one.

self-verbs. So, whilst under the present semantic assumptions the relevant distinction falls out naturally from the orthodox account of reflexives, the arity-reducer theorists should deploy further theoretical resources in order to draw the needed distinction between verbs compatible with distinct individual contents (under the same guise) and verbs that are not.

The arity-reducer theorist can postulate her way out of some of these predicaments by saying that there is an ambiguity between reflexive pronouns and logophoric pronouns, and that logophoric pronouns are not interpreted as reflexivisers. Leaving aside the potential theoretical cost of ambiguities, it is clear that the wax museum cases do not involve logophoric pronouns, as they don't crucially depend on the attitude holder's point of view.

The advocate of the arity reducer analysis of reflexives might protest that the criticism from the Madame Toussaud's constructions is misguided, because although reflexives are indeed claimed to reduce the arity of the verb, there is still an appropriate slot (variable) in the logical form corresponding to a distinct individual (given under some guise). That is, by applying the denotation of the reflexive *himself* to that of the verb *admire*, we get a semantic value of the form  $\lambda x.x$  admires  $x$ , where the two occurrences of  $x$  will be assigned the same guise standing for distinct individuals (say, at two situations of the context).

However, the denotational economy account, as it stands, is not equipped to handle the Madame Toussaud's cases along the lines suggested above. This is because, on this account, there is only a unique referent in the sequence. This referent remains in place and is not moved to the end of the sequence when the reflexive which is anaphoric on it is being evaluated. On the reflexiviser (arity-reducer) analysis, this reflexive enters in the computation of the truth-conditions directly by being combined with a self-property (which is predicated of that referent). No matter what denotation we attribute to this referent, it cannot do the job of the two separate denotations in the standard (non-arity-reducer) analysis of reflexives. The standard analysis of reflexive produces an asymmetry by allowing two separate denotations for *Ringo* and *himself* (Ringo himself and the statue, respectively). What is asserted is that Ringo in fact admires his statue, but his statue is not said to admire Ringo. On the reflexiviser analysis, the same (self-)property is attributed to a guise. The guise may in effect yield two distinct (but similar in their general features) individuals on the occasion of utterance. The assertion according to the reflexiviser analysis can thus be paraphrased as follows: the individual with such and such [Ringo-like] features is engaged in self-admiration. But this is not what is asserted by the wax museum sentences. To assert what the wax museum sentences assert we need to be able to separately manipulate the 'self' expression inside the

reflexivised verb, since this is the locus where the said asymmetry is introduced. (I have already suggested how to obtain the right reading on the denotational account coupled with the standard analysis of reflexives. We get the asymmetry simply as a result of the direction of movement of the relevant guise, from *Ringo* to *himself*, rather than *vice-versa*.)

Although a more intricate account might obtain the right reading, another problem for the reflexiviser analysis is, as hinted above, that it assumes a divide between logophoric and non-logophoric pronouns. As we shall see below, the standard account of reflexives will make the denotational economy account treat uniformly logophoric and non-logophoric pronouns.

In light of these considerations, I preliminarily conclude that the arity reducer account of pronouns cannot be maintained. Consequently, Non-Redundancy will need to somehow regulate Condition A cases as well. It remains to be seen what other constraints are needed in order to have a semantic condition that fully covers Condition A phenomena. From the perspective of a semantic, economy-based framework, it is important that we can deal with the problematic condition A cases reviewed here.

#### 4.3.3 Antecedence

In order to add a crucial assumption to our account of the Condition A effects, it is instructive to look at phrases such as *he himself*, and *as for myself*. Kuno (1987, 118ff.) discusses Ross on the [pronoun reflexive] construction, in which, *pace* Ross, one element can be deleted. They call these constructions *emphatic reflexives*.

81. a) Tom<sub>i</sub> believed that the paper had been written by Ann and him<sub>i</sub> himself<sub>i</sub>.
- b) Tom<sub>i</sub> believed that the paper had been written by Ann and him<sub>i</sub> himself<sub>i</sub>.

The question arises as to how these reflexives are bound. For these cases at least, the standard notion of antecedence breaks down, since the reflexives do not seem to be bound by a c-commanding position in the relevant binding domain (for an explication of c-command, see fn. 3). But if we assume a broader notion of antecedence, we could explain such cases, and, at the same time, we get a better grasp of some of our Conditions A and B obviation. Considering first the Condition A configuration (70c) *This paper was written by Ann and myself* and (70d) *Physicists like myself/\*himself are a godsend*, it looks like the speaker serves as contextual antecedent for the otherwise problematic reflexive (*myself*). There may be further criteria that the antecedent should satisfy (see Kuno (ibid., p. 121)). The case (70d) shows that the covert antecedent is constrained as to its person features, and, in

particular, it cannot be 3rd person: *\*physicists like himself*. In other words, the *covert* antecedent can be only 1st or 2nd person, that is, its referent can be only the author or the addressee. (Such a restriction does not exist on overt antecedents: *John said to Mary that physicists like himself were a godsend*. (Kuno (1987, p. 123)).)

There are further interesting apparent condition A violations that suggest that a broader notion of antecedence is at least sometimes needed. Take for instance expressions like *as for myself* as they appear fronted in sentences like (82).

82. Kuno (*ibid.*, p. 129)

- a) As for myself, I won't be invited.
- b) ??As for yourself, you won't be invited.
- c) \*As for herself, she won't be invited.

Kuno posits that the pattern in (82) involves logophoric clauses, that is, clauses that distinctively express the author's attitude. Consequently, the pronouns in these clauses can have the same value as the author of the speech act, and, to my ear, they can refer to the addressee.<sup>14</sup> Hence, we gathered some initial motivation for introducing one of the key notions of the semantic account of binding, the notion of antecedence. Although these examples do not require an economy principle, they do require the notion of antecedence to which the semantic economy principle, Non-Redundancy, seems to be sensitive in some other cases. As the examples above suggest, the covert non-sentential antecedent should be the author of the utterance, and, perhaps, the addressee (but surely not a third party). As I shall explain below, the assumption about antecedence is independently needed.

The thrust of our discussion of Condition A cases is that we are forced to consider reflexives as contributing their own individual guises to the truth-conditions of the sentences in which they appear, and that the notion of antecedence needed to account for some of the reflexives is broader than the standard one.

As Schlenker (2005) and many others observed, the latter assumption, which introduces a broader notion of antecedence, improves the data-base of the binding theory. It thereby improves the denotational economy account of binding as well.<sup>15</sup> One of the nice fea-

<sup>14</sup> These examples also pose problems for the arity-reducer analysis, since, as I have pointed out, that analysis needs a separate account of logophoric reflexives, whereas the standard analysis of reflexives will cover both logophoric and non-logophoric pronouns in a uniform fashion.

<sup>15</sup> It should be noted that Schlenker (2005) continues to talk in terms of c-command. That is, for him, the objects in the sequence are related by c-command. However, he must have in mind an extended notion of c-command, one that applies to elements that are covertly introduced in the syntactic structure, which should then be in a position that c-commands the noun phrases overtly present in the surface structure—see below for further examples that suggest just that.

tures of the denotational economy view—with its attendant notion of antecedence—is that it can explain why mentioning in an utterance the name of the speaker or hearer, or a definite description known to be referring to the speaker or hearer, produces infelicity. For instance, suppose that Mary, the philosopher of language, tells John, the semanticist, one of the following.

83. *Infelicitous uses of names and definite descriptions for the speaker or hearer* (adapted from Schlenker 2005, p. 14)

- a) #Mary has taught three classes today.
- b) #The philosopher of language taught three classes.
- c) #The semanticist should meet me in the pub this evening.

In uttering these sentences, Mary is referring to herself by (83a)-(83b), and to John by (83c). Most of the time, such utterances sound out of place. The rationale is, in broad outlines, quite obvious. Mary could have used a pronoun instead of the name or definite description in order to convey the same propositions. Non-Redundancy can straightforwardly explain the resulting infelicity. Instead of pulling referents from the sequence out by using pronouns, such cases use full noun phrases (viz. definite descriptions and names), and the full noun phrases redundantly introduce the same referent once again, contrary to what Non-Redundancy requires.

However, the trouble is that at some other times such forms of expression are totally acceptable. Following C. Collins and Postal (2012), we may call the noun phrases in question *imposters*. To illustrate, a doctor could felicitously ask his patient *How are we doing today?* and the patient could equally felicitously reply *We are doing better today*. It is clear that *we* here refers to the patient, although it does not have precisely the most appropriate number features. A similar dialogue can be imagined along the lines of the example (83a) above. Thus, someone may ask Mary *What has Mary been doing today?*, to which Mary could well reply: *Mary has taught three classes today*. Here too, the pronoun *you* may be more appropriate than the proper name, since the use of names usually indicates that the speaker and hearer talk about a person who is not present in the context of the utterance, or is far off in some sense. Both *we* and *Mary* act differently than expected, and that's why they were called imposters.

It is very tempting to see such phenomena as purely pragmatic. On this view, imposters are deployed in a playful way in order to make some communicative point, thus implicating something non-stereotypical related to the form of expression.<sup>16</sup> However, such cases

<sup>16</sup> It is natural further to incorporate these cases to the principle M of the pragmatic account (roughly, the Gricean maxim of manner), on the basis that such forms of expression are marked, and thus encourage picking out different propositions than the ones intended.



should be handled with care, since, as C. Collins and Postal (2012) argue, they seem to be syntactically constrained. For instance, they produce economy effects, but generally abide by the binding theory, except for their idiosyncratic agreement features. In any event, such imposter phenomena require explanation, be it syntactic or pragmatic. If the syntactic explanation offered by Collins and Postal is better than a pragmatic one, then we should examine how the syntactic explanation can be cast in terms of the denotational economy account.

Imposters do seem to have a pragmatic motivation. How to spell out their pragmatics is not clear. However, they may be used as a communication facilitator (think of a fathers' use of the imposter *daddy* when addressing their kids, e.g. *Daddy is going to get you an ice cream*) or to obtain some special stylistic effect, e.g. irony (cf. e.g. *The semanticist forgot his syntax 1.01?*).<sup>17</sup> I leave a proper account of imposters under denotational economy assumptions for future work.

#### 4.4 CASE STUDIES REVISITED

I have made a *prima facie* case for a cluster of assumptions (having at its core the economy principle, Non-Redundancy) on the basis of some of the binding phenomena in §4.2.1. (I discuss the rest of the data introduced there in §4.4.2.) From now on, when speaking of the binding theory (and its principles), I shall speak of whatever cluster of principles and assumptions will do the work of the traditional binding theory in the denotational account (Non-Redundancy, antecedence, guises etc.).

In this section, I turn to the examples whose interface economy treatment I found objectionable in the previous chapter. Recall that in the previous chapter I discussed two study cases, and concluded that the economy based accounts dealt with these cases in an unsatisfactory manner. I have argued that the interface economy accounts are unduly complicated because of the ways they conceive of the econ-

<sup>17</sup> Indeed, Schlenker (2004) motivates something akin to what I have here identified as imposters by appeal to pragmatic effects. (He presents them as an obviation of a principle he calls Minimise Restrictors—roughly, a principle which requires that relatively specific noun phrases should introduce denotations distinct from the denotations previously introduced by other noun phrases, if any.) He considers expressive-restrictors, and he argues that the reason why these expressive-restrictors are allowed (despite being overly specific) is that they convey an extra-message. For instance, *John<sub>i</sub> is so careless that [the idiot]<sub>i</sub> will get killed in an accident one of these days* (*ibid.*, p. 3), sounds fine with the definite description in the second clause referring to John himself on the pragmatic grounds that the use of the expressive *idiot* is relevant for the communicational purposes of the speaker. As such the expressive definite seems to violate the binding Condition C (viz. full noun phrases must be free/not bound) or, on the semantic account, Minimise Restrictors. But note that there is more to imposters than their occasional expressive content. Imposters like *Mary* or *daddy* above do not contain any expression standardly assumed to be expressive, so a more general account is needed.

omy principles (as interface phenomena). In the following sections, I continue this argument by targeting the empirical basis of those uses of interface economy. I argue that the denotational economy is better equipped to deal with the economy data in the two study cases, both in terms of its smooth interface with pragmatics and in terms of its generality.

Before going any further, a cautionary note is in order. I shall substantially shift the theoretical aims of the original extensions of the linguistic economy principles used in the two study cases. The explanatory ambitions behind these cases were different—they tried to capture the best accounts of *de se* pronouns and specificational sentences. These are not my aims. My main focus is to better integrate the economy principles in a more general account of binding, and, besides, I do not agree with some of the assumptions of the theories the economy principles were meant to serve.<sup>18</sup>

#### 4.4.1 *De se* cases

In the coming discussion, I continue to abstract away from many details of the compositional semantics of *de se* attitudes and reports, and focus on how the standard semantic values of pronouns with *de se* readings fare with the semantic economy mechanism. I implicitly assume a semantics along the lines of the standard approaches to *de se*, although I wish to remain neutral with respect to several details regarding the syntactic realisation of the *de se* readings.<sup>19</sup>

#### *De se* and *de re*

Let us go back to the analysis of the previous *de se* cases, repeated here for convenience.

84. I dreamt I kissed me.

- a) I dreamt  $OP^{\log} \lambda x$  I  $\lambda y$  kissed  $me^{\log_x}$ . *non-local binding*
- b) I dreamt  $OP^{\log} \lambda x$  I  $\lambda y$  kissed  $me^{\log_y}$ . *local binding*

The two possible structures of (84) realise non-local binding (a) and local binding (b), according to whether OP or the lower constituent *I* binds the pronoun *me*. OP is a logophoric operator whose role is to introduce the author of the thought (or the centre) in the content of the attitude verb (*dream*), and is responsible for the *de se* readings of the pronouns that it binds.<sup>20</sup> As we have seen in the first study

<sup>18</sup> As I shall make clear, I do not think that there is a (semantic) *de re* blocking effect, and I find suspect the purported contrast between specificational and predication sentences with respect to the connectivity effects.

<sup>19</sup> For more details, see Ninan (2010) and Schlenker (2011) and especially Anand (2006).

<sup>20</sup> To get a clearer picture of the compositional semantics of the two binding structures in (84), let's focus on the clause embedded under the verb *dream*. As suggested in

case, the pattern in the data is explained by the principle of binding economy along with its insensitivity to the truth-conditional distinction between first-personal and *de re* readings. Anand (2007, pp. 11-2) argues that this seemingly *ad hoc* assumption is not completely unwarranted, since Condition A is equally insensitive to the distinction between *de re* and *de se* interpretations. He thus interprets the following example from Heim

85. Lakoff dreamt he was Jesus and forgave himself all his sins.

as showing that Condition A—precisely like the aforementioned Binding Economy principle—does not ‘see’ the contrast between the *de se* and *de re* interpretations.<sup>21</sup> I offer here an alternative proposal which agrees with Anand’s latter observation but not with his use of interface economy.

I contend that the behaviour of pronouns in dream reports can be explained in terms of guises, the semantic economy principle, and some intuitive pragmatic reasoning. Recall that on our view the examples discussed above involve two distinct sorts of cases: (i) cases where complex guises matter; and (ii) cases where individual guises matter. The typology further ramifies. The individual guises are either trivial or non-trivial, and the non-trivial ones are either *special* (or *mixture*) guises or simple individual guises.

The ensuing multiplicity of guises reflects, in my view, a more complex pragmatics due, in part, to the identity asserted in the standard dream report cases. In principle, the binding patterns of a dream report case (with identity) can be affected by multiple way of interpreting the embedded pronouns. Thus, these pronouns may take, what I call, mixture guises as denotation, or can produce complex guises at a higher node (viz. structured properties). These denotations can thus

(84), in principle, there are two binding possibilities. Here are the two derivations, following the compositional rules in Heim and Kratzer (1998, pp. 112-114).

- *Non-local binding*:  $\llbracket I \text{ kissed } me_i \rrbracket = \text{OP} \lambda x. [\llbracket I \text{ kissed } me_i \rrbracket g^{[i \rightarrow x]}]$  (by Predicate Abstraction) =  $\text{OP} \lambda x. [I \text{ kissed } g[i \rightarrow x](i)](x)] = \text{OP} \lambda x. [I \text{ kissed } x]$  (by Traces and Pronouns Rule)  $\approx I \text{ kissed the author of the thought (viz. the centre)}$ .
- *Local binding*:  $\llbracket I_i \text{ kissed } me_i \rrbracket = \text{OP} [I \lambda x. x \text{ kissed } me_i] g^{[i \rightarrow x]}$  (by Predicate Abstraction) =  $\text{OP} [I \lambda x. x \text{ kissed } g[i \rightarrow x](i)] = \text{OP} [I \lambda x. x \text{ kissed } x]$  (by Traces and Pronouns Rule)  $\approx I \text{ kissed myself}$ .

According to Anand’s (2006, pp. 49-52) analysis, OP is an abstractor that is dominated by a node whose semantic value is the centre (the person doing the thinking in that context). Thus OP just serves the centre in order to combine with the denotation of OP’s sister. On this assumption, when local binding takes place the abstraction determined by OP is vacuous.

<sup>21</sup> The reflexive in (85) is problematic because it appears to be outside the c-command domain of its potential antecedent *he*. However, if we take the conjunction to co-ordinate VPs or V’ rather than clauses, *he* ends up c-commanding *himself*. Here, I assume that *he* doesn’t c-command *himself*, and that the binding effect (covaluation) is obtained via a principle of economy. In fact, binding without c-command will do all the same.

interact with binding theory in the expected way. My claim is that it is indeterminate which of these strategies of pronoun-interpretation should be applied to a dream report sentence with identity when we consult the sentence out of the blue. Outside cases with assumed identity, I shall maintain that there is theoretical motivation for a minimal involvement for guises. But first things first. I start with the observation that the pragmatics of the *de se* cases is more complicated than formerly assumed, especially when the *de se* pronouns are interpreted under identity assumptions.

Now, here is, to a first approximation, what can be said by adopting two of the options above: complex guises and individual guises. (84) may be allowed (thus obviating condition B) because it expresses a different complex guise from the one that would have been expressed using a reflexive pronoun, instead of the non-reflexive pronoun.<sup>22</sup> Thus (84) requires complex guises. One complex guise is a structured property akin to kissing someone (expressed by using the pronoun *me*) and the other guise is the property of self-kissing (expressed by using a reflexive).<sup>23</sup> It is in virtue of expressing the former property that covaluation is possible. To deal with (85), I proceed in a similar fashion as in the Madame Tussaud's examples. That is, I assume that there is a unique individual guise available, which serves as the semantic value of both *he* and *himself*. Consequently, Condition A is satisfied.

I suggest that mixture guises can potentially explain the dream report cases with identity. As for simple (individual) guises, they are not available in the *de se* cases. I conceive the simple guises producing *de se*-readings as being 'author' guises, that is, individual concepts that yield the author of the attitude (the attitude holder) at every possible world. I shall argue that these guises are not available, and that only trivial guises (roughly, referents) are available to the binding mechanism.

As I suggested, the option invoking individual guises can appeal to a special notion of guise that is made possible by placing the pronoun in the context of an identity statement (*Lakoff is Jesus*). Intuitively, in the dream reports whose content consists in part of an identity statement, the ensuing guises are like mixtures of two substances, related by a (perhaps symmetric) relation akin to the relation of putting together or forming a compact group. Another way to see this relation is as a process of identification—Lakoff is identified with Jesus, forming the Lakoff-Jesus mixture. It seems that such mixture-based semantic values can be referenced in natural language.

22 Note though that the reflexive construction *I kissed myself* can—but it need not—express a different meaning. As I shall propose, we may fix on mixture guises, and accommodate both reflexives and pronouns.

23 In lambda notation, the two properties are  $\lambda x \in D_{\langle se \rangle}. \lambda y \in D_{\langle se \rangle}. x \text{ kisses } y$  and  $\lambda x \in D_{\langle se \rangle}. x \text{ kisses } x$ , respectively.

86. If Lakoff is Jesus, then *Lakoff-Jesus* forgave us all our sins.

Such a mixture can bind a reflexive pronoun that will thus end up referring to a similar mixture (formed from the same substances). Since only such a mixture-guise is present in (85), Condition A is satisfied. It should be intuitively clear that no such mixture-guise is involved in (84) (since no process akin to becoming/identification has to be assumed in that case), and thus the Principle B is there obviated by some other means, e.g., by complex guises, as earlier suggested. However, focusing on the full original example, *I dreamt I was BB and I kissed me*, there is a mixture based solution to the problem of explaining the acceptability of the sentence. If a Lakoff-Brigitte Bardot (L-BB) mixture guise enters the sequence of evaluation as the referent of the second occurrence of the indexical *I*, we can see that there is an intuitive reference overlap between this mixture and the referent of the pronoun *me* (L). I speculate that in this particular case, both the marginal felicity and infelicity of using the pronoun is due to the partial overlap between L-BB and L. It is felicitous to the extent the referents are partly different, but it is infelicitous to the extent that there is some reference overlap.

Another possibility left open by the original dream report is that the second occurrence of *I* denotes Jesus (or the corresponding trivial guise that yields Jesus at every possible world) and *me* denotes Lakoff. That effectively means that *I* shifts its meaning from Lakoff to Jesus. No violation of the binding theory follows.

It seems to me that it is characteristic of the interpretation of dream-report cases under identity assumptions that we are left wondering *who's who*, thus having trouble establishing the identity of the individuals to which the noun phrases refer. In other words, these dream report cases are indeterminate, and pragmatic reasoning is required in order to establish the semantic values of the relevant noun phrases. So far, I presented two takes (based on complex guises and individual guises) on the pair of (84) and (85), but note that there is nothing precluding both these possibilities being realised by the grammar. Nevertheless, for the purposes of analysing the dream-report cases, I shall set aside complex guises, since an individual guise approach, together with a richer pragmatics, are exactly what we need to understand these cases. I see the involvement of pragmatic factors in the interpretation of pronouns in dream reports as far more substantial than previously admitted in the literature. My claim is based on the following observations. In order to establish the expressions on which pronouns are anaphoric, it is often crucial to use our background knowledge. Consider the following example due to Levinson (2000).

87. *The interpretation of pronouns depends on world knowledge* (ibid.)

- a) Police<sub>i</sub> arrested the protesters because they<sub>i</sub> feared violence.
- b) Police arrested [the protesters]<sub>i</sub> because they<sub>i</sub> advocated violence.

The pronoun *they* will be taken to refer to the police in (87a), and to the protesters in (87b), despite their being embedded in identical syntactic environments. Anand's data seem to manifest a similar kind of context-sensitivity. Compare for instance the contrast between the following two sentences, which are parallel to Levinson's sentences above. I put the likely interpretations of the pronouns in parentheses, where BB = Brigitte Bardot and L = Lakoff.<sup>24</sup>

88. *Sentences uttered by Lakoff with the parenthetical referential intentions*

- a) I dreamt I was BB and I (BB) kissed me (L).
- b) I dreamt I was BB and I (L) asked for an autograph of me (BB).

It seems that the interpretation of the first person pronouns *I* and *me* depends on the stereotypes associated with the interpretation of the scenario. It is thus more likely that the dream reported in (88a) is about Brigitte Bardot kissing Lakoff, whereas the dream reported in (88b) is stereotypically interpreted as being about Lakoff asking for Brigitte Bardot's autograph. The possibility of swapping the interpretations of the pronouns shows that dream report cases under identity manifest more flexibility than the theorists discussing them allow for.<sup>25</sup> However, as the above examples make it plausible, the unattested reading is a by-product of the contextual setting. Presumably, it is in some sense more interesting for Brigitte to kiss Lakoff than the other way around. But in a different contextual setting, the bias in the interpretation of pronouns is clearly shifted.

The latter two remarks suggest that it is binding theory which drives—or imposes strong constraints on—the interpretation of referential expressions, especially in the atypical cases of dream reports. That is to say, when a pronoun is used, the interpretation as to its referent will be chosen such that its referent is different from the referent of the previous pronoun, in compliance with principle B of binding theory (or with the semantic reinterpretation of this principle). Thus, we get the ⟨BB,L⟩ and the ⟨L,BB⟩ sequences, which are both acceptable according to Non-Redundancy. When a reflexive is used instead of the pronoun in (88), we look for a 'minimal update'

<sup>24</sup> For the moment, I leave out the special, 'mixture' guise interpretations, and focus on the equally plausible, non-special guise interpretations.

<sup>25</sup> Anand (2007, p. 1) for instance, considers that a reading entirely analogous to (88b) (his example (2b)) is unattested.



of the assignment of semantic values to the previous noun phrase in order to accommodate the requirement of binding theory (or, on the semantic view, of Non-Redundancy). Thus, the two noun phrases (*I*, *myself*) end up having the same referent, say BB-L. This fits better the dream-world identity BB=L.

However, there is a problem with the assumption that binding theory is equally well accommodated no matter what pronoun we are using. Note the asymmetry between *himself* and *him* in (89).

89. a) Lakoff dreamt he was Jesus and forgave *himself* all his sins.  
 b) ??/?Lakoff dreamt he was Jesus and forgave *him* all his sins.

The infelicity of (89b) suggests that the interpretation according to which Lakoff=the forgiver and Jesus=the person forgiven is not right. (This interpretation works for (89a).) If that would be the right interpretation, the sentence (89b) should be perfectly acceptable, even more so than (89a). In principle, if the above speculation to the effect that binding theory drives the computation were right, we should *not* be able to see the contrast between pronouns and reflexives in this case. Binding theory should be able to impose an interpretation which is compatible with the requirements of the binding principles. The fact that pronouns do not seem to trigger disjoint (rather than dependent) interpretations in (89b) suggests that our speculation was wrong. However, we may trace the infelicity of (89b) back to the ambiguity of *him*, coupled with the pragmatic oddity of the salient way of resolving the ambiguity. The salient, but odd, way of resolving the ambiguity would be one on which Lakoff forgave Jesus all his sins. Note that the similar construction *Lakoff dreamt he met Jesus and confessed him all his sins* is much better than (89b). The moral is that we don't need a truth-conditional economy principle in order to deal with the interpretation of dream reports. The semantic reinterpretation of binding theory coupled with pragmatic factors can account for the referential dependency relations.

My hypothesis is in stark contrast with the judgements expressed by several theorists (e.g. Anand 2007; Percus and Sauerland 2003) who claim that there is an asymmetry between sentences like (88a) and (88b). This is because they think that there is a blocking effect present in dream reports to the effect that *de re* pronouns cannot c-command (and thus bind) *de se* pronouns. For these authors, only the former reading, (88a), is acceptable.<sup>26</sup> On my view, the contrast in judgements is a matter of pragmatic salience. Once we endorse

<sup>26</sup> Perhaps not incidentally, I do not share Anand's judgements about the dream-reports data—which are cited in favour of his hypothesis put forward in order to explain the above, purported asymmetry. Anand (2007, pp. 3-4) admits that a non-negligible part of his informants do not see any asymmetry between dream reports and other attitude reports with respect to the blocking effect he hypothesises.



that the pragmatics of dream reports under identity assumptions is more complex, there is no need for positing a divide between attitude verbs which manifest this asymmetry and those which don't. Background information, rather than the type of verb, is at the origin of the perceived asymmetry.

Therefore, I think the *de re* blocking effect—that prevents *de re* noun phrases from c-commanding *de se* pronouns—is not the right generalisation. To see this more clearly, here is an anti-*de re* blocking scenario. In my dream, I happen inadvertently to send to myself on a messenger app a line that contains only the following emoticon: “:-)\*”. Suppose I receive this line without realising who is the sender. Knowing that, in chat slang, the :-)\* emoticon means blowing a kiss, I can felicitously report the event by saying *I dreamt I kissed me*. Likewise, someone may report my dream by saying *Andrei dreamt that he kissed him*. Now notice that although I was the conscious receiver of the cyber-kiss, I was not aware of sending the emoticon, and thus I was not aware of being the cyber-kisser. So, I can be aware that I'm being kissed, without being aware that I'm the kisser. This means that *me* (or *him*) is interpreted *de se*, but the indexical *I* (or *he*) has a purely *de re* interpretation. We don't need the *de se* and *de re* individual guises to explain the purported obviation of binding theory. If this is in effect an obviation, the acceptability of coreferential noun phrases can be considered an obviation of Non-Redundancy due to the pragmatic payoff associated with expressing a different complex guise (the property kissing someone, rather than self-kissing).

The *de re* blocking effect, albeit a stable phenomenon, is a *pragmatic* regularity following from the fact that, usually, when a person is aware of being the *agent* of an action (or activity) whose object (or patient) is that very agent, that person is also aware of being the *object* of the action. So, usually, when the agent and object of an action are the same, awareness of the identity of the agent correlates with awareness of the identity of the object. This fact about attitudes is also reflected in the ascriptions of attitudes. However, this fact is not a semantic fact, but rather pertains to the pragmatics of attitudes and attitude ascriptions.<sup>27</sup>

#### *Sensitivity to simple guises*

To highlight an important aspect of the denotational economy account and the main difference between this account and the competing accounts, let us look at another *de se* case. Sharvit (2011) argues that binding theory needs to be sensitive to two notions of covaluation (type 1 and type 2 covaluation) in order to account for constructions such as the following:

<sup>27</sup> Cappelen and Dever (2013) and Jaszczolt (2013) put forward similar pragmatic views.

90. McCain convinced Palin to vote for herself/\*her.

91. [ Palin [ 6 [ McCain convinced<sup>de re-w<sub>0</sub></sup> t<sub>6</sub> [ 3 5 [LD PRO<sub>5</sub> vote  
for-w<sub>3</sub> herself/\*her<sub>6</sub> ]]]]]

(91) gives the logical form of (90). Glossing over some details, the key idea behind Sharvit's reinterpretation of binding theory is the following. On Sharvit's account, PRO<sub>5</sub> and *herself/her*<sub>6</sub> are type 2 covalued since the former denotes the self of the attitude holder *via* binding by *convince* and control by t<sub>6</sub>, and the latter denotes the attitude holder herself, namely Palin, *via* type 1 covaluation (i.e. standard binding).<sup>28</sup> So, on this view, there are two guises, which are syntactically (and referentially) linked to each other by a non-standard syntactic/lexical mechanism.

This proposal raises an important issue. The issue is whether we want to get *de se* ('author') guises into the extended binding theory (including the economy principles). Should our theory of binding constructions with *de se* pronouns be sensitive to simple (i.e., individual as opposed to complex) guises? There are several options. One is to say that binding principles (including economy principles) are not sensitive to distinctions between certain guises (Anand 2007). The other is to say that binding principles are sensitive to such distinctions, and thus need reformulation in terms of guises (Sharvit 2011). I endorse both the sensitivity and insensitivity strategies for different cases. However, insofar as the *de se/de re* readings are concerned, I argue that it is better to view the denotational economy mechanism, and thus binding theory, as totally insensitive to them. Consequently, my contention is that no matter which of the options we take, we don't need to posit insensitivity of economy to the truth-conditions of the two LFs proposed by Anand.

To see this, we have to refer to the denotational analysis of the data. Does our economy-based account deal with the object control construction in a way that shuns a partially 'anaemic' truth-conditional economy principle, but can still compete with Sharvit's account? As we have seen, the basic semantic resources of the denotational account consist of individual and complex guises. Let us check the solution in terms of complex guises. If Sharvit (*ibid.*) is right that the binding theory principles should be stated in terms of two notions of covaluation, we can try to model the two covaluation constructions as economy competitors. Recall that the hallmark of an economy principle is that it allows logical forms with novel truth-conditional semantic values that could not have been obtained by purely grammatical means. On this option, complex guises—rather than individual guises—determine the relevant semantic values (those semantic values that could not have been obtained otherwise). The problem with this proposal is that it does not seem to have any pragmatic

<sup>28</sup> Anand (2007) and Percus and Sauerland (2003) discuss similar data.

motivation. One could respond, by arguing that sometimes grammatical rules do not provide us with intuitive pragmatic motivations, but this would conflict with our pragmatic desideratum. Other things being equal, we need to employ principles that make sense from a pragmatic perspective. It turns out that this is possible.

The other option is to appeal to simple guises, along with further restrictions on their availability. We have  $PRO_5$  denote the attitude holder (Palin) and *herself/her*<sub>6</sub> denote a guise of the attitude holder. But this means that the semantic values of the two binding expressions are distinct, which would make the wrong predictions. To get the same semantic value, we need to say that the two expressions denote the *same* guise/referent. I shall opt for this more minimal assumption to the effect that the *de se/de re* cases above do not involve different guises, but rather a single constant guise (or the corresponding individual referent). Binding theory is sensitive to purely *de re* referents of reflexives. Thus I take it that PRO and the reflexive/pronoun are coindexed in the object control sentence (90), repeated here (with annotation added) for convenience:

92. McCain convinced Palin  $PRO_i$  to vote for herself<sub>i</sub>/\*her<sub>i</sub>.

The coindexation between PRO and the reflexive/pronoun would explain the patterns of judgement—the satisfaction of Condition A and the violation of Condition B—without presupposing Sharvit’s baroque logical forms. As far as I can tell, there is no syntactic difficulty with such a hypothesis.<sup>29</sup> It remains to be seen *how* to get the *de se* readings pragmatically, and, more pressingly, *why*, while many other extravagant meanings enter the semantics, *de se* readings are not allowed in. The mechanism of guises provides a suggestion regarding the ‘how’ question. Since we can formulate the denotation of a *de se* pronoun as a guise akin to the denotation of the description *the author/experiencer of the attitude*, once the attitude holder sees herself through such a guise, she cannot fail to be self-conscious (that is, she cannot fail to believe the centred proposition where she is agent at every possible world). Then, in order to obtain a contextual *de se* reading of a pronoun, the pronoun will receive an ‘author’ guise as value.

Some may regard this strategy with suspicion, since just a moment ago I adopted the ‘special guise’ solution that involves a richer pragmatics. Is the previous solution in tension with the minimal solution adopted for *de se* and *de re* cases? No, it isn’t. As intimated, both the sensitivity and insensitivity assumptions are legitimate in different types of cases. In particular, the case of identity under attitude reports tends to produce sensitivity, while attitude reports outside identity-contexts produce insensitivity. Note that the object control

29 For instance, Haegeman (1994, pp. 261–2) adopts basically the same pattern of coindexation between PRO and the reflexives in c-commands.

construction is not a case of identity, whilst the previous cases involved identity in an essential way. As we have seen, identity cases are special in being able to give birth to a richer pragmatics, and, more specifically, to a more substantial involvement of guises in the binding theory. I have argued that special ‘mixture’ guises are made possible by the identification (of, say, Lakoff and Jesus) in the clause of the dream-attitude verb. I have also shown that complex guises can assume part of the explanatory burden, as they implicitly did in Reinhart’s original account of binding obviation.

Why does identity trigger sensitivity? This presumably happens because the identification gives rise to several pragmatic possibilities that couldn’t be exploited otherwise. An argument that this is the case proceeds from embedding the object control sentences under dream reports with identity, and comparing the resulting constructions with the object control sentences without assumed identity.

- 93. a) Mrs McCain dreamt she was Palin and that she convinced her PRO<sub>i</sub> to vote for herself<sub>i</sub>/?her<sub>i</sub>.
- b) Mrs McCain dreamt she was Palin and was convinced PRO<sub>i</sub> to vote for herself<sub>i</sub>/?her<sub>i</sub>.
- 94. a) If Mrs McCain were Palin, she would know how to convince her PRO<sub>i</sub> to vote for herself<sub>i</sub>/?her<sub>i</sub>.
- b) If Mrs McCain were Palin, she would be convinced PRO<sub>i</sub> to vote for herself<sub>i</sub>/?her<sub>i</sub>.

By changing the gender of the (McCain) agent in the object control sentence (92) to avoid unnecessary complexities and by embedding the resulting construction in a context in which the identity is asserted, as in (93) and (94), the initial contrast in acceptability of the coindexed pronoun vs the coindexed reflexive in the original object control sentence (92) fades perceptibly. Admittedly, this judgement is a bit hazy. Nonetheless, if a slight improvement in the degree acceptability of the coindexed pronoun is indeed discernible, this can be so because the identity assumption induces a richer pragmatics, and Non-Redundancy can be satisfied by non-standard means such as special guises. For instance, on the special guise reading, PRO denotes the McCain-Palin mixture, *herself* denotes the same mixture, and *her* denotes either Palin or Mrs McCain. The coindexation between PRO and *her* is possible because, in an intuitive sense, there is an overlap of reference between the mixture and the purported denotation of the pronoun (Palin or Mrs McCain). (Still further interpretations of the pronouns may be available in the identity case.) But in the absence of identity, only trivial guises are available, and the condition A and B effects are present thus making the coindexation impossible.

I must confess that I'm not entirely convinced by my own judgments regarding (93) and (94). For some reason, the identity context does not yield an acceptability of the pronoun *her* as it did in (89b) (for the pronoun *him*). If so, my contention that identity contexts generally have an impact on binding theory should be revised, by inspecting why the object control sentences preclude sensitivity of binding theory to a richer pragmatics (and, in particular, to special guises). Be that as it may, the claim that object control sentences (e.g. (92)) can be accounted for by defining the binding principles over referents (or trivial guises) still stands unabated.

In sum, my position regarding the *de se* and *de re* cases is the following. I agree with Anand that the economy mechanism does not discriminate between *de re* and *de se* readings. (This commits me to interpret, unlike Sharvit, the object control constructions without building *de se* readings in the binding theory.<sup>30</sup>) However, I think that the dubious economy mechanism posited by Anand is not necessary. Some economy mechanism is in play in the interpretation of such cases, but those interpretations (i) do not involve distinguishing between *de se* and *de re*, and (ii) are only some among the many other interpretations that are pragmatically available for those constructions.

In identity cases, the pragmatics is richer, but even there, the *de se/de re* readings do not seem to have an impact on binding theory. Crucially, nor does the *de re* blocking effect (preventing *de se* pronouns from being c-commanded by *de re* noun phrases) seem to be present in identity cases. I think that excluding the *de se/de re* distinction completely from the domain of binding theory and, thus, from the domain of Non-Redundancy (the insensitivity approach applied to *de se/de re*) is conceptually advantageous relative to positing an economy principle that is insensitive to that distinction, but nevertheless building the distinction in the semantics. It is conceptually advantageous because it yields a stronger and more general principle of economy, and a more elegant binding theory.

More generally, when it comes to the right treatment of *de se* pronouns, there are two general, and quite distinct, methodological ideas that can guide the approach. One is to build as much as possible in the compositional semantics (and ultimately in the syntax), and then adapt the binding theory to the richer semantic apparatus. This is by far the dominant strategy in formal semantics.<sup>31</sup> Another option is to

<sup>30</sup> However, this difference should not be inflated. My assumption and Sharvit's are not all that different after all, because she claims that in (92) the binding theory (in particular, principles A and B) should be sensitive to the different guises of *the same individual*, namely Palin and her 'self' (the 'author' guise), and I state binding theory over the same trivial guise, the Palin-guise. (And, on my assumptions, trivial guises are akin to individuals).

<sup>31</sup> Percus and Sauerland (2003) and Sharvit (2011) are representative theorists.

be as minimal as possible about syntax and semantics.<sup>32</sup> Under the latter analysis, the *de se/de re* distinction does not make it in the truth-conditional content at all. This distinction is obtained pragmatically or by some other means (e.g. by deriving it from purely structural, non-truth-conditional properties of the logical forms).

It is not clear to me how to argue conclusively for one of these two options. Given the desiderata laid down before, I would choose the second, more semantically minimalist strategy. This allows me to keep to a ‘maximal’ structural parallelism between the main principles known to be governing the syntax, semantics, and pragmatics of binding. In particular, it allows me to use Non-Redundancy as the main semantic principle that regulates binding. This might seem like expressing a cavalier attitude towards the semantics, since I leave the *de se* outside the semantics of binding, and simply don’t account for it at all. However, the difference between my account and the more mainstream ones should not be overstated. I agree that the correct analysis of *de se* pronouns is along standard lines. My contention is that the standard semantic values of *de se* pronouns are not relevant for the purposes of binding theory. Moreover, I do not see any theoretical virtue in building richer structures into semantics in order to capture a negligible part of what is, in fact, a much richer pragmatic phenomenon. In contrast, the minimal account I favour allows for a better interface between semantics and a certain region of pragmatics, and preserves the insights of denotational economy (which in turn preserves the insights of the traditional binding theory).

#### 4.4.2 Copular sentences and pure identity cases

I have dealt with contexts in which identity is assumed, and studied their implications for the interpretation of noun phrases relevant for binding theory. But what happens to ‘pure’ identity cases, i.e. cases where the interpretation of the noun phrases inside the identity clause itself (rather than outside it, as before) is at issue? I turn now to pure identity cases and next to the (related) copular sentences that were the subject matter of the second case study in the previous chapter. The pure identity statements are a species of copular sentences, which fall (in part) under the incidence of the binding Principle C. I thus have the chance to tie two loose ends that pertain to Principle C effects in copular sentences.

Identity cases such as *John is John* have been mentioned as challenges for Principle C (Reinhart 2006; Safir 2004). These are *prima facie* problematic for Principle C given that according to that principle the two occurrences of the DP *John* should not be coindexed. It appears that identity statements are subject to Principle C since the

<sup>32</sup> Higginbotham (2010) is the only representative of this approach to *de se*. J. Collins (2007) and Neale (2007) have similar positions on domains other than *de se* pronouns.



two noun phrases (proper names) are in a c-command relation. *Prima facie*, we have no reason to stipulate that identity statements fall outside the incidence of Principle C. Consequently, the semantics should interpret the two as referring to different individuals. However, this is manifestly not so. A way out of this predicament is to say that the semantics does not treat the two occurrences of *John* as bound either, and hence does not use the  $\lambda$ -term  $\lambda x(x \text{ is } x)$  (the identity relation) in order to interpret the sentence. Rather it is accidental coreference, not binding, which is the result of semantic interpretation.

Some version of the maxim of quantity (preventing one to convey unnecessary, e.g. trivial, information) can in principle regulate the (broadly speaking) referential semantic values introduced by an utterance. The usage of the same referential semantic value very much weakens the meaning expressed by the identity statement, and the usage of a different referential value determines a strengthening of the meaning of the identity sentence.

Now, Non-Redundancy can be seen as a grammatical extension of the maxim of quantity (or the Q-principle advanced by Levinson 2000), and can do that maxim's job with respect to identity cases. Intuitively, statements such as *John is John* are not usually interpreted by default as logically necessary, and thus (under plausible assumptions) as informationally trivial statements.<sup>33</sup> Nor are the similar identity statements of the sort mentioned in (72c), and even (72b) meant as necessary statements; rather, they are intended to provide some useful information. If so, one doesn't convey—and is not taken by the audience to convey—a trivial statement by uttering identity statements such as the above. That would amount to a violation of Non-Redundancy. In more pragmatic terms, there is pressure to make the identity statement strong enough for communicative purposes. This is why one should be non-redundant in uttering/interpreting identity statements. The prediction is clearly borne out.

Being a bit more specific about our semantic assumptions will benefit the understanding of the current account of identity statements. I take proper names to be very closely related to definite descriptions. I also assume that proper names have some descriptive content and express guises (individual concepts).<sup>34</sup> Consequently, we can get the

33 Identity statements, if true, express necessary truths. While I do not want to contest the distinction between metaphysical necessity and epistemic necessity, some identity statements that are metaphysically necessary will be recognisably epistemically necessary as well—and this is the case for some of the identity statements that call into question the principle C of binding theory. Necessary truths have seldom any value in communication, especially when such communication involves statements of the form *John is John*. It is the epistemic status of identity statements that is relevant to the semantics/pragmatics of binding. In other words, binding theory does not look at the metaphysical entities standing for noun phrases, but at the information encoded by these noun phrases.

34 These guises may be trivial (or actualised), in which case we can accommodate the standard intuitions of rigidity.



infelicity specific to Condition C effects through the Non-Redundancy principle, since their presuppositional and assertoric content are comparable to the content of other noun phrases. If the proper names are more specific than pronouns, as seems plausible, they will tend to introduce new referents. Thus, *John said that John saw the movie*, and *The man said the man saw the movie* are both bad under a covaluation reading, since they will each introduce redundant objects in their respective sequences of evaluation. (Pronouns will be in a better position to express the desired covaluation, by pulling out their semantic values from positions more to the left of the sequence.)

While we are at principle C, let us discuss the rest of the binding economy data in order to illustrate how the denotational economy account handles them. Note that in (72b) *Cicero turned out to be Tully* and (72c) *He is Ralph* the relevant noun phrases will introduce different guises in the sequence of evaluation, e.g. *the man called Cicero*, *the man called Tully*, *the salient male* etc.. Recall also the example where the identity of an individual is under discussion, e.g. (71d). Suppose that, precisely as in the (71d) example, in uttering *She praises Zelda to the sky*, the speaker refers to Zelda herself. This is a standard obviation of principle C, because the pronoun has a guise as semantic value (given under a contextually appropriate description), whilst the name *Zelda* has a different (constant) guise as semantic value. Therefore, the two noun phrases introduce different referents in the sequence, and hence the construction abides by Non-Redundancy. These are all different individual guises.

A different type of case involves Evans-style obviation of principle C, which involve uses of proper names such as *If everyone hates Oscar, Oscar hates Oscar* (example (72a) above). We are already familiar with such examples: Non-Redundancy is satisfied at the level of complex guises (or structured meanings). The predicate *hate Oscar* expresses a differently structured semantic value than *hate himself*, although they are truth-conditionally equivalent in that context. If we couldn't satisfy Non-Redundancy at the level of a higher node (expressing a property), this would have been a clear violation of Condition C (or Non-Redundancy).<sup>35</sup>

Coming back to the copular cases discussed in the preceding chapter, let us see how we can account for them. Recall the identity statements for which truth-conditional economy principles were postulated by Sharvit (1999).

95. What John is shaving is a pet which belongs to him.  
*predicational, specificational*

<sup>35</sup> It should be stressed that we are not pretending to offer a wholesale vindication of Condition C, but just to give an account of the reasonable predictions made by this principle. We can use two names to express identity, and when we do, we violate Condition C. A more nuanced binding principle is needed to cover these cases.

96. What he is shaving is a pet which belongs to John.  
*predicational, \*/(?)specificational*

I do not share Sharvit's (\*) unacceptability judgement for the specificational coreferential reading for *he* and *John*. This reading seems to me much less deviant, and more like an acceptable, though slightly odd reading—whence the (?).<sup>36</sup> In fact, we can imagine a felicitous utterance of (96) under the specificational interpretation in the following sort of scenario. Suppose that we are in a situation where the identity of a contextually salient person is under discussion, and I utter (96) under the specificational interpretation as evidence that that salient person (the referent of *he*) is John. Giving up the unacceptability judgement and thus the necessity of explaining the purported contrast between (95) and (96), we can give a uniform economy-based explanation for both of these cases. To explain what is going on in these examples we don't need to form reference sets and compare derivations, as on Sharvit's interface economy proposal. As I have pointed out in the previous chapter, both operations involve great costs, and seem to be *ad hoc*. According to our denotational economy account, the bound reading of (96) will be ruled out by Non-Redundancy. Proper names are more restricted than pronouns, and therefore when they appear in a sequence after a pronoun they should introduce their own, distinct referent. If they do not, we end up with two identical objects in the sequence, and one of them is redundant.

As I remarked, Non-Redundancy has a broader pragmatic significance (cf. Levinson 2000). Note that analogous referential patterns hold good at the discourse level. For instance, *He entered the room; John then sat down* does not have a reading on which *he* and *John* have the same semantic value. This is readily explained by the semantic economy principle alongside the assumption that proper names are less dependent than other noun phrases. We thus have a unified explanation of the copular constructions in terms of semantic economy.

<sup>36</sup> But even if you do find this judgement to be available, there is a plausible assumption that added to the DE-account can account for the judgement. A predicational copular sentence such as *What he is is an eccentric man and a total nuisance to John* can be treated in the sequence-based approach similarly to constructions like *It is his<sub>i</sub> father that John<sub>i</sub> hates* and *His<sub>i</sub> father called John<sub>i</sub>*, where John's father is the salient individual entering the sequence of evaluation rather than John when noun phrase *his father* is processed. Likewise, John does not get in the sequence on the second occurrence of the name *John*, but that salient, topicalised complex property *an eccentric man and a total nuisance to John*. Thus John is introduced in the same sequence of evaluation—which we may call the *topic-sequence*—at most once. In contrast, in specificational sentences, the second occurrence of *John* introduces an individual-topic (rather than a property), and this is redundant because the first occurrence of the name has previously introduced the same individual. For this account to work at all, we need two sequences of evaluation (topical and non-topical) instead of one (cf. Bittner 2001).

## 4.5 CONCLUDING REMARKS

If this approach is on the right track, two noun phrases can have one of the following categories of pairs of semantic values (on our semantic assumptions, guises) and contents (*qua* worldly individuals that are the values of the guises at the relevant world and intuitively correspond to the noun phrases).

97. *The typology of noun phrases' semantic contents (broadly speaking)*
- a) same guise, different individuals (wax museum cases (70b));
  - b) different guises, same individual (the identity under discussion cases (71d), identity statements (72d));
  - c) same guise, same individuals (ordinary, non-identity, uses of proper names (72a));
  - d) different guises, different individuals (other ordinary uses of noun phrases).

According to the above typology, the guiding principle of the semantic/pragmatic restatement of the binding theory, Non-Redundancy, will be formulated sometimes over individual guises (of the two varieties: constant and informative) and at other times over complex guises. Admittedly, this proposal barely scratches the surface of binding phenomena. My intent has been to provide a useful description of a cluster of data, rather than to explain a phenomenon in detail. I have glossed over a number of syntactic intricacies of binding and omitted a detailed semantic analysis of the phenomena. But I have not set out to do that. Instead, my purpose was to show how a more fine grained semantics for noun phrases alongside a central principle of economy can alleviate traditional problems for binding theory, and to point to the main ingredients of a successful account of binding. Another, more concrete, purpose was to demonstrate the relative advantage of the semantic economy account of binding as opposed to the standard interface truth-conditional economy account. The major advantages of the current account over the truth-conditional economy accounts is that the former is always compatible with the pragmatic considerations involved in the evaluation of a broad range of linguistic data, and its basic assumptions are much more elegant than those of its main competitor.

The advantages of the present account, as well as its difficulties, follow from the assumption that the denotational economy account needs several types of guises and some (default or pragmatic) restrictions on the occurrence of such guises. Also, it should be clear that the problems for this account do not pertain to its not being parsimonious. Individual guises do the job of both individual referents and the standard (informative) Fregean guises. The latter are independently needed for understanding communication and the so called

Frege puzzles involving propositional attitudes.<sup>37</sup> We can interpret the individual referents as trivial guises (or actualised descriptions): constant functions, which deliver, at each world or situation, the same individual. Thus, the treatment is simple enough; it has as a fundamental notion, the notion of guise, which can in turn be of several types: individual (trivial, special, and simple) and complex.<sup>38</sup> In what follows, I point out two important challenges facing the denotational economy project.

The first problem is how to distinguish between binding and coreference on the denotational economy view. Binding is straightforward in this system: it consists of moving individual guises in the sequence to a newly created slot, at the end of the sequence. The expression corresponding to the initial position of the guise is said to bind the expression corresponding to the newly created slot. The individual guise that is pulled out is the semantic value of both the binder and bindee expression. In contrast, something akin to the notion of coreference is justified only in cases where *distinct* guises (either simple or complex) are introduced in the sequence of evaluation. More specifically, coreference appears just in case there are distinct guises of the same individuals, that is, guises that yield the same individual at the actual world, but yield different individuals at other possible worlds.

Guises have played an important role in this discussion, and in particular, in accommodating the obviation of Principles A, B, and C. But, unfortunately, it is well known that unconstrained guises grossly overgenerate. As Schlenker (2005, p. 18) remarks, one should find ways to limit the involvement of guises in binding theory, since otherwise all the binding theoretic violations could be cancelled by letting binding expressions take guise-values contextually. Heim (1998), in discussing the same problem, suggests that the right restriction is to disallow contexts with distinct guises that are presupposed to be coreferential. In her terms, contexts never assign *distinct but presupposedly coreferential* guises.<sup>39</sup>

37 What's usually contested—but nonetheless assumed here—is that these Fregean guises are part of the semantics. Some theorists will have them as part of pragmatics. I won't enter the debate about the proper division between semantics and pragmatics here. For me, this division is instrumental. What's important for my purposes is to argue for a semantic account of binding which is consistent with what was already conceived (with some degree of success) as the syntax of binding. To be sure, the present remarks about the semantics of binding can be reconstructed as remarks about the pragmatics of binding.

38 Schlenker (2005) discusses some of the basic test cases for Non-Redundancy, the Dahl puzzle and quantifier binding. The semantic economy solution to the Dahl puzzle needs some stipulation, but it should be remarked that so does Fox's truth-conditional solution. See discussion in the previous chapter.

39 See Heim (1998, 216 fn.11, 2011, pp. 204-7) for outlines of the proposal. Schlenker (2005, 18 fns. 18-9) suggests a potentially different approach. He appeals to the notion of conceptual cover from Aloni (2005). Aloni conceives of a conceptual cover as a set of guises that are in one-to-one correspondence with the domain of individuals at each world. (As Aloni shows, conceptual covers can be deployed to solve several

There are two possible ways to develop these ideas. One is to say that guises of individuals always stay ‘packaged’ in the sense that if there are multiple descriptions for the same individuals, these descriptions will form a conjunctive guise, rather than several separate guises of the same individual. Under pragmatic pressure—e.g. when a perceptual guise is given contextually—there may exist two guises for the same individual. These are the cases where binding theory obviation occurs. However, in the next step the guises merge if they are ‘recognised’ by the competent speaker as being different guises of the same individual.

In contrast, the second potential implementation grants that multiple guises for a unique individual may indeed be available to cognition in general. What we need to assume, though, is that, in general, only unique guises for each individual are available to the grammatical economy mechanism dealing with binding. Grammar ‘packages’ unique guises for each individual. (Perhaps memory limitations can be invoked to render this hypothesis more plausible.) Nonetheless, in special contexts, where there is the necessary pragmatic motivation, the mechanism will allow two distinct guises for an individual. This solution has the advantage of eliminating the need to artificially limit the number of guises. However, it does this at the price of assuming the modularity of the denotational economy principle.

By modularity here I mean a restriction on the guises rather than a restriction on the domain of syntactic/semantic data to which the economy principle applies. So the restriction is one that belongs to the interface between semantics and pragmatics and has the effect of creating a bottleneck in the ‘flow’ of guises towards binding theory. In other words, I do not mean modularity in the sense that the economy principle is trumped by multiple other grammatical principles and contextual factors. This latter type of modularity is precisely what I found objectionable in chapters 1 and 3. So the range of constructions under the incidence of the semantic economy principle is wider than it used to be in the case of interface economy principles. Non-Redundancy is central to the denotational economy account, sanctioning virtually all the binding constructions surveyed here, whilst the interface economy principles were, as we have seen, rather marginal within an account of binding.

I have argued for the denotational economy approach to binding theory obviation, and I have also made a case that denotational economy promises to offer a general account of binding. The force of this account lies in the intuitive appeal that the central principle, Non-Redundancy, enjoys, and, more specifically, its pragmatic motivation.

---

puzzles pertaining to attitude ascriptions.) Schlenker then suggests that working with a unique conceptual cover for binding expressions in the unmarked cases seems to be the needed solution. In other words, conceptual covers are a natural constraint on the availability of guises.

I have also showed how to handle *de se* constructions and copular sentences in the denotational economy framework. An important challenge—one that I leave for future work—comes from the additional assumption that guises are in play in the denotational account of binding. The challenge is how to manipulate the introduction of guises in order to predict the coreference and disjoint reference patterns specific to BT. A further development concerns the broader notion of antecedence. I have shown that this notion can accommodate cases that were previously unavailable to binding theory. However, I have not discussed the differences between the notion of antecedence and the standard definition in terms of c-command, let alone cases of pronouns bound to their antecedent from non-c-commanding positions. Indeed, I assumed that antecedence incorporates an extended c-command relation that can be established not only within the sentence, but also between the author and audience of the context and the referent introduced in the sentence.

In this chapter I sketched an account of binding economy phenomena, showing how the account deals with the *de se* pronoun cases and copular constructions, which proved to be problematic for the standard accounts of linguistic economy. In presenting the semantic economy account, I also argued for its superiority relative to the interface economy accounts, according to two desiderata (the generality of the economy principle, and their transparent pragmatic motivation). This completes the second part of the thesis, dealing with binding phenomena. What I have achieved in this second part is, in crucial respects, similar to the outcomes of the first part of the thesis, which dealt with scope. There, as well as here, I have made a *prima facie* case for moving away from the ‘interface’ characteristics of the standard economy principles (and, specifically, from their very restrictive domain of application) towards a semantic/pragmatic account that gives a more central role to linguistic economy considerations. I turn next to investigating the consequences of economy for the semantics of noun phrases and for the idea of logicity in natural language.

### Part III

## FURTHER CONSEQUENCES OF LINGUISTIC ECONOMY



# 5 | LOGIC IN NATURAL LANGUAGE

I have always respected those who defend grammar and logic. We realise, fifty years later, that they averted serious dangers.

---

Proust, *Le Temps Retrouvé*, 106

## 5.1 INTRODUCTION

In the previous chapters I argued against a series of assumptions built into the standard economy accounts of scopal and binding phenomena, and I proposed a cluster of assumptions that should be part of the economy-based accounts of scope and binding. These chapters contributed to a descriptive work on scope and binding. In the following two chapters, I set out to show that economy principles are far from being abstract linguistic mechanisms, instead having important consequences for issues in the philosophy of language. If some of the essential assumptions on which the economy-based accounts of scope and binding are correct, we can draw conclusions about some structural properties of language, viz. logical properties, as well as about the nature of noun phrases, e.g. demonstratives. To show that the economy-based accounts have these important consequences, I need to backtrack and assume a baseline economy account of binding and scope. I choose as baseline accounts the standard economy-based accounts. They are well-known, and have some important empirical coverage.

The assumptions of the standard economy-based accounts on which I rely, as well as the assumptions of the arguments in the next two chapters, do not contradict my claim (in the previous chapters) that the standard economy-based accounts are unsatisfactory. First, the relevant properties are presumed by my account as well. In particular, the inferential properties of certain linguistic constructions are essential in establishing the grammaticality of the logical forms that disambiguate the linguistic construction in question (this is also the case for my accounts of scope and binding). Second, my overall arguments in the next chapters (especially the first) do not depend on the

economy-principles being *entirely* true. In particular, the arguments of the next chapters go through even if the mechanisms posited are semantic/pragmatic rather than pertaining to the interface between syntax and semantics (where the computation is supposed to take place according to the standard principles of economy).

In this chapter I spell out a consequence of having economy-based constraints on natural language, namely, a thesis concerning the relationship between logic and language. The logicity of natural language, albeit a classical theme in philosophy, is controversial, mainly because there is still no consensus about what exactly is meant by the thesis that natural languages have or lack logical structure.<sup>1</sup> This is, to be sure, partly due to difficulties inherent to the notion of logicity, but is equally a consequence of the lack of awareness regarding linguistic phenomena that can support the idea that fragments of natural language exhibit logical properties. Here, I shall make a case for the thesis that language is logical—the logic in natural language thesis, LNL, for short—based on linguistic phenomena that have not been seriously considered in relation to LNL. I am primarily looking at the LNL thesis from a *linguistic perspective*, and thus I need to make some standard assumptions about logical notions, without arguing for them. My aim will then be to show that these logical properties, arguments to the contrary notwithstanding, are also grammatical properties, broadly speaking.<sup>2</sup>

LNL says that language has *bona fide* logical properties. The thesis goes beyond mere regimentation of natural language in a logical system. The claim is not only that some items of logical vocabulary can be used to translate natural language sentences. LNL is rather a thesis about certain linguistic properties of natural languages or fragments thereof. These linguistic properties are deemed *logical*. In principle, these logico-linguistic properties can be located anywhere that is theoretically fruitful: at the level of syntax, semantics, pragmatics, or at some interface level between these ‘modules’. LNL can receive support from a strong analogy between these purported logico-linguistic properties—as they arguably appear in linguistic hypotheses—and

- 1 The logicity of natural language has been denied (in different ways) by both ideal and ordinary language philosophical traditions but was put forth and defended (in different forms) by the works of Montague (1974), Grice (1967/1989) and many others. Talk of logicity is familiar from linguistics textbooks (Chierchia and McConnell-Ginet 2000, Gamut 1991, Heim and Kratzer 1998, Kamp and Reyle 1993.) Notions of logicity and formality are also much discussed in philosophical logic (e.g. Etchemendy 1990/1999, Sher 1996).
- 2 The argumentative strategy will be similar, in broad outlines, to the one adopted by Grice. Grice (1967/1989) argued that apparent counterexamples to the hypothesis that logico-linguistic expressions (especially, conditionals and conjunctions) function as their truth-functional counterparts in standard logic can be mitigated by factoring in pragmatic effects. It is in this spirit that our argument proceeds, although I would like primarily to consider potential syntactic and semantic constraints, rather than Grice’s pragmatic constraints on the logical behaviour of some natural language expressions.

the logical properties of formal languages. The latter type of property are far better understood, and among them we have all sorts of logical consequence relations, validity and other properties based on semantic invariance. It is some such properties that LNL postulates about natural language.

The LNL thesis can be spelled out in several ways, according to what we take *logic* to be, and which *aspect* of natural language is our focus (syntax, semantics, lexical semantics, pragmatics etc.). I shall assume, for purely heuristic reasons, a standard, classical view of logic, along the lines of first order logic, or an extension thereof. It will also be important to distinguish between two versions of the LNL thesis, according to the epistemic role that logic plays in linguistic inquiry:

- 98. logicity figures in the formulation of novel empirical hypotheses, principles etc. in linguistics. (*Empirical role*)
- 99. logicity is a 'big fact' about language, or a general constraint. It is methodologically and conceptually desirable that hypotheses reflect or are compatible with such general constraints. (*Normative role*)

Although the two notions are related (since there is a sense in which both have empirical consequences) their epistemic roles are different. To distinguish between the two, consider the principle of compositionality, which qualifies as a 'big fact' about language. Note that linguistic hypotheses need not make explicit reference to compositionality in order to be considered empirically adequate. However, their compatibility with (some form of) compositionality remains an adequacy criterion for such accounts. *Ceteris paribus*, a linguistic hypothesis compatible with the big facts is better than one which is not. So both the strictly empirical and the conceptual (or normative) understandings of LNL are relevant here. However, some skeptical arguments against LNL are implicitly based on the idea that if logicity in the first sense is not an option, the LNL thesis is not worth holding. This conclusion is not warranted, because both versions are important. In fact, my argument will defend LNL in both these senses.

The plan of the chapter is the following. I start by discussing a linguistic hypothesis about binding phenomena that, arguably, involves logicity (§5.2.1). I show how the logicity of binding phenomena can be implemented in a first order language (§2.2). I then turn to the arguments that LNL detractors have advanced against logicity in natural language (§§5.3.1–5.3.4). I show that these arguments fail (to different extents) to make a strong case against LNL. The key points made here are (i) that there are linguistic phenomena that, as it were, wear logicity on their sleeves and, moreover, (ii) that there

are several ways of defining the relevant logicality features (e.g. logical consequence relations, validity) that the sceptics have overlooked. In closing, I discuss the conceptual advantages of the LNL thesis.

## 5.2 LINGUISTIC EVIDENCE

In this section I take as a case study a linguistic phenomenon that suggests that logical relations play an important role in grammar. The principle of binding economy underlying the linguistic phenomena that will be discussed below is well-supported by linguistic evidence, albeit not unanimously accepted. I shall assume that this principle is plausible. My point does not depend on the absolute correctness of the Binding Economy hypothesis. I am primarily interested in the potential explanatory role that logical properties have in linguistics. Accordingly, I shall also gloss over several syntactic and semantic details pertaining to the binding domains and the noun phrases that enter binding relations. The LNL thesis is independent of such details. (A clearer picture of what an account of binding would look like is proposed in chapter 4.)

### 5.2.1 A linguistic hypothesis: Binding Economy

Binding theory (BT) (Chomsky 1981) deals with referential dependence between binders (antecedents) and bindees (anaphors, broadly speaking). Let us call the two kinds of expressions potentially entering in a binding relation *binding expressions*. Principle (or Condition) C of BT says that full noun phrases (e.g. proper names) should be always free (not bound). Principle C covers a broad range of data, among which the following.

100. a) \*She<sub>1</sub> told Claudine<sub>1</sub> to sit down.  
b) \*He<sub>1</sub> greeted Oscar<sub>1</sub>.

The natural unacceptability judgements elicited by (100a)–(100b) (under the readings expressed by coindexing) are readily accounted for by Principle C. The referential dependency (represented by numeric indices) is not allowed because proper names cannot be bound, according to the binding principle C. However, it has been noted (firstly in Evans 1980) that binding expressions in configurations like (100) can on occasion refer to the same entity. For instance,

101. a) She<sub>1</sub> is Claudine<sub>1</sub>.  
b) Only he<sub>1</sub> still thinks that Oscar<sub>1</sub> is smart.

are both acceptable under the interpretation that the pronouns refer to the very same person referred to by the name that follows. In

(101a) this seems even to be required. In contrast, (101b) is most naturally uttered on an occasion in which many people think Oscar is not smart, but Oscar himself still does. So these are apparent violations of Principle C of BT.

A natural solution that attempts to preserve Principle C is that the (101) cases are not in fact cases of binding (referential dependency) but cases of (accidental) coreference. Hence, according to this intuition, there are two kinds of, what we might call, *covaluation*: binding and coreference. Although this intuition is on the right track, it is incomplete because we want to know how (and why) the grammar distinguishes between the two types of covaluation, binding and coreference. (Otherwise, it would look like an *ad hoc* strategy to do away with recalcitrant data.) A principled reason for distinguishing between the two types of covaluation is given by a principle of economy, along the lines of Rule I of Reinhart (2006). I shall call this principle *Binding Economy* (BE) and state it informally as follows.

**Binding Economy (BE):** The binding and coreference readings of a given sentence must be compared as to their semantic content and the coreference reading ‘wins’ if and only if it has a different semantic content than the binding reading.

The principle of economy compares the competing linguistic forms underlying the binding readings and coreference readings. These linguistic forms are the elements of a set, or comparison class. The competing linguistic forms entering the comparison class are ranked according to two criteria: *lexical identity* (roughly, same words) and *meaning identity* (roughly, same truth-conditions). The former criterion is obligatory (i.e. no linguistic form enters the competition unless it contains the same set of lexical items as its competitors), whilst the latter is, as we shall see, rather optional. Thus, Binding Economy selects among lexically identical linguistic forms (i.e., linguistic forms built out from the same lexical items) that linguistic form which is the ‘best’. Being the best may mean two things: (i) coreference linguistic forms are selected (as ‘winners’) only if they satisfy lexical identity but *not* also semantic identity (i.e. if they are lexically identical to the competing binding linguistic forms, but semantically distinct from them); otherwise, (ii) the binding linguistic form, i.e., the linguistic form realising binding (rather than coreference), will be the best. The existence of these two options is what makes meaning identity optional—it may be trumped if the economy condition (i) is satisfied.

What are the two, semantically different, binding and coreference readings of the sentences in (101)? Let us consider them in turn, and give an intuitive paraphrase for each of these readings.

102. She<sub>1</sub> is Claudine<sub>1</sub>.

- a) She  $\lambda x$  ( $x$  is  $x$ ) & she = Claudine. *binding reading*  
 b) She  $\lambda x$  ( $x$  is Claudine) & she = Claudine. *coreference reading*

The two readings differ crucially in the portions highlighted by the grey areas. The readings can be paraphrased as follows. She (Claudine) has the property of being identical to *herself* (binding reading). In contrast, the alternative interpretation says that she (Claudine) has the property of being identical to *Claudine*. These are distinct properties: self-identity, and being identical to Claudine, respectively. The former is trivial, the latter gives us interesting information. As suggested, the principle of economy allows coreference configurations iff they bring interesting information (namely, novel truth-conditional meanings).

Alternatively, the relevant difference in truth-conditions may be formulated at the level of the individual semantic values. Thus, we may use guises—the semantic values of definite descriptions—as semantic values for the relevant binding expressions. Thus, *she* may refer to a perceptual guise that yields Claudine at the actual world, or to Claudine herself (or to a trivial guise that yields Claudine in every world). It surely makes a difference to the truth-conditions of (101a) whether *she* takes as semantic value one guise or the other. Binding economy is sensitive to such a truth-conditional difference. Out of the two ways of spelling out the truth-conditional difference, the second is better, because it makes more pragmatic sense: it is easier to construct a context in which the pronoun *she* takes a guise as denotation. In contrast, the first representation requires that the utterer intend a specific contrast between the two properties (self-loving and loving Claudine). Were there no such intention, the account would overgenerate, since virtually any utterance can produce different structured denotations, and this would imply that the economy principle always trumps the Condition C effects (which, of course, is not what we observe).

However, the second example is better handled along the lines suggested in the first representation of the differing truth-conditional effects.

103. Only  $he_1$  still thinks that  $Oscar_1$  is smart.

- a) Only he  $\lambda x$  ( $x$  still thinks  $x$  is smart) & he = Oscar). *binding reading*  
 b) Only he  $\lambda x$  ( $x$  still thinks Oscar is smart) & he = Oscar). *coreference reading*

In a similar vein, the binding reading attributes a second place property (relation) that people bear to themselves, whilst the coreference reading attributes them a relation that people bear to Oscar.

These are again different relations. Although neither of these determines a trivial reading (as in the previous example), the two readings have different truth-conditions. The binding interpretation says that Oscar is the sole person who thinks of himself that he is smart, and the other people (salient in the context) don't think the same of themselves, but may think that of Oscar. The coreference interpretation, in contrast, says that Oscar does, and the other people do not, have the following thought: Oscar is smart. The readings thus differ in that the former is compatible, whilst the latter is not compatible, with the proposition that Oscar is smart. So, according to BE, coreference must be allowed because it yields a distinct (novel) truth-condition which also fits the context of utterance. If, contrary to fact, there were no difference in truth-conditions, BE would disallow coreference.<sup>3</sup> Note also that the different structural relations between who is the thinker and who is smart according to the thinker are more salient in (103) than the corresponding relations in (102). So the pragmatic desideratum previously alluded to is intuitively satisfied.

### 5.2.2 A sketch of a logic for Binding Economy

BE compares the truth-conditions of the binding and coreference readings in order to establish which of the two readings is allowed.<sup>4</sup> One natural way to do this is to see if one of the two linguistic forms can be true and the other false under the same interpretation (i.e. by giving each of the symbols in the two competing linguistic forms uniform interpretations). If the two can take different truth-values, they are not equivalent. Thus, the BE mechanism checks logical relations and, more specifically, mutual entailments between the two possible readings.

For the sake of simplicity, I shall use first order logic with identity to represent the BE mechanism and its computation. I take the two place predicate B to be the 'locus' of binding; roughly, it will represent binding. More precisely, B will be interpreted in two mutually exclusive ways: (i) if the two places of the predicate take two identical individual variables or constant terms (e.g. Bxx, Baa), then B means that the two terms are bound, but (ii) when the terms occurring in the two places of the predicate are different (e.g. Bxy, Bab) the predicate is interpreted as "the two terms are not bound" (this representation is akin to vacuous binding). Otherwise put, the predi-

<sup>3</sup> See Reinhart 2006, pp.186ff. for more examples, and p. 185 for a full statement of her economy principle, Rule I.

<sup>4</sup> The principles of economy are common in the Minimalist Program (Chomsky 1995). Their role is to establish which linguistic form is a grammatical logical form, and thus interpretable by the semantics. In our case, one of the two readings will be a proper logical form (LF). To establish which linguistic form will be grammatically licensed, the principle of economy checks their semantic contribution.



cate B will simulate the binding capabilities of the  $\lambda$  operator.<sup>5</sup> I shall use the identity sign as usual. Thus, the result is that the present formalism will represent binding (or lack thereof) by B and coreference by the identity sign, =. The BE mechanism will compare the coreference readings (on the right-hand side of the biconditional) and binding readings (on left-hand side of the biconditional) of the sentence “She is Claudine,” with c being the constant term standing for *Claudine* and s being the constant term standing for *she*. (The latter notation convention is not meant to say that pronouns are constants rather than variables, but is a simple notational implementation of deictic pronouns. More generally, I assume that I fixed the individuals corresponding to the constants s and c appropriately, with different individuals for different constants, unless otherwise indicated.)

104.  $(Bsc \wedge s = c) \leftrightarrow Bcc$       coreference = binding  $\Rightarrow$  \* coreference

105.  $(Bsc \wedge s \neq c) \leftrightarrow Bcc$       coreference  $\neq$  binding  $\Rightarrow$  ok coreference

From the point of view of the semantics for first order logic, the computation of (104) should intuitively yield the truth-value true, and the computation of (105) should intuitively yield the truth-value false. From a linguistic point of view, the former reflects the fact that the coreference and binding properties have the same truth-conditions, and thus coreference is disallowed by BE. The latter represents the fact that the coreference and binding readings have different truth-conditions, and thus coreference is allowed by BE. It is this latter case that represents the acceptability judgements of our two sentences in (101).

Note that the BE will hold for any sentence with a Principle C configuration, i.e., with a proper noun anteceded by a (c-commanding) pronoun. Binding Economy is a *general* hypothesis about the behaviour of linguistic constructions, under relevant syntactic and semantic constraints. Binding Economy is not only general, but, on reflection, also has the modal force of a logical statement, viz. it is necessary. Using the first order logic notation, we can safely formulate the two possible economy-based computations envisaged above in terms of derivability ( $\vdash$ ) over the relevant domain of semantic values

106.  $\vdash \forall xy((Bxy \wedge x = y) \leftrightarrow Bxx)$       coreference = binding  $\Rightarrow$  \*  
coreference

107.  $\nvdash \forall xy((Bxy \wedge x \neq y) \leftrightarrow Bxx)$       coreference  $\neq$  binding  $\Rightarrow$  ok  
coreference

<sup>5</sup> The predicate B can be taken as a logical constant (akin to the  $\lambda$  operator) or a predicate. Nothing hinges on this choice as long as we keep its interpretation constant. The above sentences will have the same logical properties, no matter what the status of B is.

or, equivalently, as

108.  $\forall xy(Bxy \wedge x = y) \dashv\vdash \forall xBxx$       coreference = binding  $\Rightarrow$  \*  
coreference
109.  $\forall xy(Bxy \wedge x \neq y) \not\vdash \forall xBxx$       coreference  $\neq$  binding  $\Rightarrow$  ok  
coreference

These statements are intuitively correct, and can be proved in any of the proof systems of first order with identity (using universal quantifier elimination, substitution of equivalents, and the rules for connectors). Either of the two pairs of statements express the general conditions under which the BE functions. Otherwise put, they express the two possible outcomes of the computation in a general fashion. Moreover, given that first order logic is sound, we can formulate the corresponding meta-theoretical statements in terms of semantic validity (replacing  $\vdash$  with  $\models$ ), and, equivalently, in terms of a semantic logical equivalence (replacing  $\dashv\vdash$  with  $\equiv$ ). Hence, it seems that logical statements characterise the behaviour of the linguistic mechanism presupposed by Binding Economy. Let us discuss some of the main features of representing logicity using the first order notation.

My implementation represents the relevant logicity features of the BE mechanism, and abstracts away from most of the lexical material not needed to discriminate between binding and coreference. As I remarked, the lexical material in the sentence is not relevant for the computation, since the two readings will be built out of the same lexical material. (See lexical identity criterion, introduced above.)

The domain of quantification of my first order formalisation (104–109) contains possible individuals or guises (functions from worlds to individuals). This is needed because the BE computation has an evident modal flavour, as can be seen in the discussion of (103) above. It is not my purpose here to give a full blown semantics for binding expressions. Very roughly, we could assume that the binding expressions (and, more specifically, pronouns) can take, in contexts, semantic values akin to either proper names or definite descriptions (where the former are rigid, whilst the latter are non-rigid). Thus, it is a *necessary* identity that Sally is Sally, but only a *contingent* identity that she (Sally) is the person talking on BBC1 almost weekly in 2013.<sup>6</sup>

<sup>6</sup> I have not spelled out the logic needed to make the required distinction in truth-conditions between the readings above, although the distinctions are, I think, intuitive enough. What we need in fact is a first order modal logic capable to express both necessary and contingent identity. (See Priest (2008, 367ff.) for an exposition of the syntax and semantics of such a logic, as well as for the proof of soundness that we need for such a logic, if we assume a semantic notion of logicity.) The two types of identity are expressed over guises, or functions from possible worlds to individuals. Two guises are necessarily identical if they pick out the same individual at all worlds, and are contingently identical if they pick out the same individual at some world.

Finally, in order for the LNL thesis to hold under a semantic (rather than a syntactic) definition of logical properties, the logical system underlying BE needs only to be sound, rather than complete as well.<sup>7</sup> This ensures that it distinguishes between valid and invalid inferences, or, alternatively, between satisfiable and unsatisfiable sentences. But it only needs to distinguish between such properties for statements of a very specific syntactic and semantic kind, that is, statements having Principle C configurations. So, the logic for Binding Economy need not cover all the valid inferences. This makes the challenges to LNL easier to meet.

If this implementation of the BE mechanism is accurate, then it seems that the binding phenomena, and more precisely the role of the distinction between binding and coreference readings in formulating BE, point to important logical features of linguistic constructions. Note that even if the BE hypothesis is not ultimately correct, it still reinforces the LNL thesis in the (98) sense above, because it is obvious that an important linguistic hypothesis refers to, or depends upon, logical features of linguistic forms. The BE mechanism computes mutual entailments of sentences having a Principle C configuration. According to the economy-based linguistic hypothesis, logical forms are licensed (i.e. are grammatical) only if they enter in the appropriate *logical relation* with their competitors. It is worth noting that I have discussed only one economy-based mechanism concerning binding, but the family of economy-based hypotheses is much wider. Similar economy-principles involving binding, quantifier scopes, and scalar implicatures have been put forward in the linguistics literature. Arguably, they too involve logicity, but our study-case should be sufficient to make this point.<sup>8</sup>

<sup>7</sup> I use first-order logic, rather than a higher order logic, for pragmatic reasons. However, first-order logic is sufficient to make our point. Using first order logic made my task of showing the potential logicity underlying Binding Economy easier, since soundness is a notorious property of first order logic. However, the same argument would carry over to lambda calculus. The legitimacy of inferring validity from derivability (i.e. the soundness property) is not limited to first order systems. Indeed, the so called *simply typed lambda calculus* assumed in linguistic semantics is also sound, so a formulation in lambda calculus of the BE will preserve my tentative conclusion to the effect that logical statements characterise the BE mechanism. (See Carpenter 1997, p. 54ff for the soundness proof of the simply typed lambda calculus.)

<sup>8</sup> For instance, Fox (2000) advances his own version of Binding Economy and Schlenker (2005) proposes a local alternative to the same principle. See Heim (1998) for a restatement of a version of Reinhart's principle of economy, as well as Büring (2005) for discussion of the economy-principles involving binding. Fox (2000) and Reinhart (2006) put forward similar principles of economy governing the scopal behaviour of quantifiers. Reinhart (*ibid.*) generalises the economy principle to scalar implicatures. Moreover, Gajewski (2002, 2009) argues based on data about generalised quantifiers and exceptive phrases that grammar is sensitive to what he calls *l-analyticity*, which is arguably a logicity property. See Chierchia (2013) for a book-length development and defence of the thesis that grammar is sensitive to logical properties. Moreover, Fălăuş (2014) argues on a cross-linguistic basis that free choice

Moreover, my preferred versions of economy principles defended in chapters 3 and 5 could also be used to make the very same point in favour of LNL. The binding economy principle, Non-Redundancy, is sensitive to identity between guises, and the controversy-based account relies crucially on contradictions and strength-based inferences (scalar implicatures). So both these accounts invoke logical properties. However, I focus here on Reinhart's binding economy account, since it is one of the standard economy-based accounts, and is very well known in the linguistic literature. It also makes clear that positing a grammar sensitive to logical properties *is* important in linguistic explanatory practice.

Before turning to problems for the idea of logicity of language, it is crucial to understand the role of first order logic in the argumentation so far. The choice to frame the problem in terms of first order logic is motivated by the simplicity and familiarity of this logic. My key claim here is that the class of consequence relations captured by first order logic (under a suitable interpretation of its logical constants) overlaps with the class of consequence relations captured by more expressive and descriptively adequate logics, and that a significant point of overlap is the computation underlying binding economy. Otherwise put, the inferences captured by first order logic cover the same properties/relations of natural language constructions (to do with binding and coreference) as the inferences expressible in a richer logic. For the purposes of this discussion, we can abstract away from the properties of these richer logics, because the point about the empirical relevance of logicity can be made by appeal to a simpler apparatus (see also footnote 7).

### 5.3 MAIN OBJECTIONS TO THE LNL THESIS

If my assessment of the above binding data is correct, it should spell trouble for the LNL sceptics. But before claiming that the challenge to LNL has been met, we have to check our characterisation of BE, and other claims favourable to the idea of logicity in natural language, against the specific claims and arguments of the LNL sceptics.

As a prelude to a detailed discussion of the main objections, it is helpful to see how the LNL sceptics view logicity and its relation with natural language. Michael Glanzberg summarises his argument against LNL thesis as follows.

First, the logic in natural language thesis is false: we do not find logical consequence relations in our natural languages. [...]

---

phenomena are also sensitive to contradictions. The present chapter can be seen as proposing an additional case study favourable to this logicity thesis.

I sketched a three-fold process that allows us to get from a natural language to a logical consequence relation. The process involves identifying logical constants, abstracting away from other features of meaning, and idealizing away from quirks in the structure of human languages. The relation between logic and natural language is thus less close than advocates of the logic in natural language thesis would have it, while the three-fold process allows that there is some connection. Glanzberg ([forthcoming](#)[b], p. 49)

It is important to note here that the LNL thesis is seen as a general thesis about natural language, rather than as a thesis about its semantics. Glanzberg's discussion focuses on semantics, and in part we shall do the same. But the moral we want to draw is about natural language, or about grammar, broadly speaking, including syntax, semantics, pragmatics, and the interfaces between them. A second important feature of LNL that we can distil from the above passage is that a key criterion for logicity is the existence of logical properties, and especially the existence of consequence relations in natural language. Accordingly, in defending the LNL, I shall have to give evidence for the existence in language of such logical properties. Finally, this passage also suggests that we get to logical processes only by abstraction and idealisation. An important task of section §5.3.4 will be to assess the impact the abstraction and idealisation have on the LNL thesis.

Zoltan Szabo voices a related worry against what he calls the *doctrine of logical form*. He states his position as follows.

The logical form of a sentence would be a characteristically logical arrangement of its parts; what gets arranged would be the sentences' extra-logical matter. The central thesis of this paper is that such a separation is impossible unless it is made actual by fiat. That is, except for artificial languages designed so as to have formulae factorable into logically significant form and logically insignificant matter, the separation cannot be made. [...]

What my view is really incompatible with is the broadly Davidsean idea that we can squeeze genuine logical forms out of a compositional semantics for natural language. That, I think, is a hopeless project. (Szabó [2012](#), pp. 108-9)

The passages from Szabo suggest that the identification of genuine logical form, as pure properties of language, is not possible. According to this claim, we cannot extract pure logical forms from linguistic data. In what follows, I shall attempt linguistically to motivate such

pure logical forms. I now turn to examining in more detail the anti-LNL positions just outlined.

#### 5.3.1 Discussion of the arguments from (in)competence and lexicality

The arguments from logical competence and from lexical semantics are stated as follows.

110. **Argument from logical (in)competence:** Logic is an educated ability, rather than part of linguistic competence (as suggested by the usual logical deviance in human reasoning). (cf. Williamson 2007)
111. **The argument from lexical semantics:** The lexical entailments cannot be systematised as formal properties of natural language, so they fail to give us a proper consequence relation. (Glanzberg (forthcoming[b]))

There are several ways to spell out the *argument from (in)competence*. I shall dispense quickly with a radical version argument under the assumption that the linguistic competence idea is on the right track. I won't provide any novel way to defend the linguistic competence idea, but I think it is a reasonable assumption. If we accept that there is an aspect of our cognition (i.e., linguistic competence) realising the linguistic principles that theorists formulate (correctly, at least sometimes), then we could also entertain that the alleged logical abilities built into linguistic competence are informationally encapsulated or inferentially isolated from the educated abilities the lack of which leads to logical deviance. In other words, logical deviance is compatible with logico-linguistic competence. To be sure, the sceptics may not be swayed by this claim of compatibility of logicity built in the linguistic competence and, at the same time, logicity as an educated ability. Their retort might be that logicity of the kind presupposed above is too complex an ability for people to possess unreflectively, at a sub-personal level. However, faced with the binding economy phenomena (and other similar ones), we should favour the possibility that logicity explains actual linguistic data. In other words, I prefer the potential explanatory adequacy of postulating logicity to ruling out logicity on intuitive and shaky grounds of psychological implausibility.

Therefore, the scepticism that I shall subsequently discuss does not deny linguistic competence and logicity altogether, but only that logicity is in any way part of this competence.

Let us then move forward to the *argument from lexicality*, (111). As Glanzberg (*ibid.*, p. 25) and many other theorists have pointed out, lexical items in natural language have very idiosyncratic entailment



patterns. An example is the different entailment patterns of the verbs *cut* and *tear*: the former entails that the action (the cutting) is done with an instrument, whilst the latter does not. The entailment generating behaviour of such lexical items is highly irregular, which makes it very difficult to see how this behaviour might count as logical. I agree with the argument from lexicality, but it has limited force, as its proponents would surely acknowledge.

It is true that the lexicon is idiosyncratic, this being one of the reasons why Chomsky isolated it as a separate module of grammar, understood “in a rather traditional sense: [as] a list of “exceptions”, whatever does not follow from general principles” (Chomsky 1995, 235, cf. 30). This is not to say, of course, that the lexicon cannot be studied theoretically, but it does suggest that the lexical semantics is not the most adequate place to look for support for the LNL thesis. It is to be expected that logicity will be part of the general principles of grammar, part of what linguistic minimalists call the *Computational System*, rather than part of the lexicon. The binding data discussed above do not concern the idiosyncratic features of the lexicon, but rather the interface between the syntax and semantics of binding. In fact, as I have pointed out, the BE principle specifies explicitly that in the competition for licensing the linguistic forms, the lexical material of the linguistic forms is kept fixed, and what is varied is only their potential to take binding or coreference readings, which determine, in turn, potential differences in truth-conditions. More generally, most of linguistics (except for lexical semantics) abstracts away from lexical properties most of the time.<sup>9</sup> In conclusion, the argument from lexicality does not challenge the LNL thesis in its strongest form.

### 5.3.2 Discussion of the argument from absolute semantics

The argument from absolute semantics is the central objection against LNL.

112. **The argument from absolute semantics:** Linguistic semantics assumes a fixed, absolute model in spelling out the (shared) meanings of natural language sentences and expressions, i.e. their truth-conditional contributions. But then natural languages lack a logical consequence relation, because this notion is defined in terms of preservation of semantic value across models. Therefore, natural languages lack an essential logical property. (Glanzberg (forthcoming[b]), cf. Lepore 1983)

Before going into the argument from absolute semantics, an important remark about the interpretation of linguistics works is in order. Michael Glanzberg claims that even mainstream model-theoretic semantics, as presented in e.g. Heim and Kratzer (1998) is, or at least

<sup>9</sup> Glanzberg himself makes a very similar point in Glanzberg forthcoming(a).



can plausibly be reconstructed as, absolute semantics (see Glanzberg (forthcoming[b], 21ff)). Let us grant that this is plausible with respect to proper names and predicates. We should note that once we move to functional items, absolute semantics becomes less appealing.<sup>10</sup> However, I won't begin by disputing the interpretation of model-theoretic semantics as absolute semantics. I shall try to conceive of absolute semantics in the best light. Indeed, I shall argue that even if we assume the most appealing absolute semantic desiderata, it is still desirable to rule logical properties in rather than out of language.

The other three objections are closely connected to the absolute semantics objection, so it is helpful to sketch this connection before getting into details. All the objections attack the (logical) formality of the linguistic constructions. Formality, or what I have called *logicality*, is perhaps most naturally conceived as invariance under permutations of the domain, or invariance under changes of model. That is, the linguistic expression or construction deemed to be formal, should preserve its semantic value, which may be a specific truth-functional function, in the case of logical constants, or the truth-value true, in the case of sentences. Now, the argument from formality (117) says that language does not isolate for us logical constants (as opposed to non-logical ones). The argument from absolute semantics (112) says that we actually cannot even define logical constants, valid inferences, and logical consequences, simply because the space of models needed to do this is not among the tools of natural language semantics. Finally, the argument from abstraction/idealisation (119) says that in order to isolate the logicality we want, we have to postulate or identify the logical constants (the basic invariants), and then abstract away from the absolute model (on which natural language semantics is based), thus getting a space of models, and then idealise so as to remove the linguistic idiosyncrasies of the linguistic constructions deemed logical, e.g. the distributional idiosyncrasies of natural language quantifiers.<sup>11</sup>

<sup>10</sup> For instance, von Fintel (1995), who is working within the model-theoretic tradition, clearly has no absolute semantics presuppositions. In fact von Fintel takes functional items to be in part logical items. These items are “invariant under permutations of the universe of discourse”, which—for von Fintel as well as for an important logic tradition—basically means that “logicality means being insensitive to specific facts about the world” (pp. 178ff). Therefore, in assessing whether the semantics is assumed to be absolute, it very much depends on what are the semantic phenomena one is looking at. More generally, I agree with Yalcin (2013) that the notion of semantic value in linguistic semantics is to be construed as different from content. Absolute semantics, on the other hand, construes semantic values as contents.

<sup>11</sup> In order to make the argument from formality independent from the argument from absolute semantics, we can formulate it as targeting a pre-theoretical and intuitive notion of logical constant. Indeed, both Glanzberg's and Szabo's arguments can be reconstructed as saying that the pre-theoretical notion of formality is problematic. As we shall argue below, the intuitive character of formality is precisely what makes the argument against LNL weak. Once we find a theoretical criterion to define formality

5.3.2.1 *On absolutism*

In this chapter, I assume that absolute semantics is tightly related to a model-theoretic semantics, in the sense that absolute semantics assumes that only a unique model interprets the linguistic expressions—this unique model is called *absolute*. I take it that the main motivation for construing the semantics for natural language as being absolute is to dispel relativism. There should be facts of the matter according to which a phrase has the fixed meaning it has, and absolute semantics is meant to represent these facts by assuming an absolute model.

A central point in the articulation of the present argument depends on what one understands by a model, in the mathematical sense. At the very least, a model is a structure comprising a vocabulary (symbols), a domain (or universe of discourse) consisting of individuals, and possibly other types of objects, and an interpretation that assigns objects in the domain to vocabulary items. By taking a model and modifying any of its three components (vocabulary, domain, interpretation), we get a *different* model, which will be somehow *related* to the model it is built from. It is this characteristic of model-theory that allows us to define distinct but related models that makes it initially unclear what an absolute model is.

A natural feature that might make a model an *absolute* model is that it consists of a fixed domain of objects, interpreted naturally as objects of the real world.<sup>12</sup> This feature is needed for realist or objective semantics, worthy of the name “absolute”. (The absolute semantic values in the fixed domain can be either internal or external. Absolute semanticists see them as external, but the argument against LNL is independent of this assumption.)

But this does not yet pin down the notion of an absolute model. We can still ask how big such a model is, what it consists of, how to construct an absolute model, and in effect if there *need* be only one such model. To begin with, we may think of the absolute model generated from a fixed domain as giving us the basic elements out of which we can build the denotations of complex expressions. Under this interpretation, the absolute denotations of complex expressions

---

for a class of expressions, the issues arising from our pre-theoretical intuitions are no longer problematic.

12 The absolute character of the semantics is related to the distinction between a fixed- and variable-domain interpretations. This distinction is at the centre of a debate in the history of logic regarding Tarski’s explication of the notion of logical consequence. See Mancosu (2010) for a very useful discussion of the topic. As far as I can see, only fixed-domain interpretations are compatible with absolute semantics.

should not be part of the absolute model.<sup>13</sup> This is not the way that absolute semantics is standardly conceived of.

The advocates of absolute semantics have in mind a broader notion of absolute model, one which encompasses the recursive principles building complex semantic values from the syntactic arrangement of more basic expressions and their meanings. This broader absolute model can be viewed as a (recursive) *extension* of the initial model containing only the semantic values that serve as interpretations for the basic vocabulary. Therefore, on this broader view, absolute semantics contains a space of absolute models. The smaller models interpret particular linguistic constructions.<sup>14</sup> I take this broader view to be desirable, since it is capable of giving absolute semantic values to all the expressions of a language, including especially complex expressions.

In sum, with observations about absolute semantics in place, a natural question arises: What does the absolute semantics view make of our argument that the BE is characterised by logical statements?

#### 5.3.2.2 *Ways to define logical properties compatible with absolute semantics*

The argument from absolute semantics attempts to deny us the right to use the model-theoretic resources (the space of models) in defining logicality or formality of the BE mechanism. So, according to the argument against LNL, our seemingly logical statements are general, but not also formal and necessary, as the usual logical statements are. This is because the formality and necessity properties come *via* a space of models: for a sentence to be necessary it should be true in all models; for an expression to be a constant is for it to have the same semantic value in all models. Some expressions are formal because their values do not vary with the information supplied by models, but they are solely determined by the meanings of logical constants (cf. Glanzberg [forthcoming\(b\)](#), pp. 7-8). Lacking a space of models,

- 13 For instance, the denotation of “white dog”, a dog individual having the property of being white, on this hypothesis, is not part of the absolute model. Only the whiteness property and dog individuals are part of the absolute model, and we get the denotation of the expression “white dog” by extending the model, i.e. by adding a piece of vocabulary of the model (built out of two extant words according to syntactic rules) and by further adding a new composite object in the domain of the model, which will be linked to the piece of vocabulary just introduced by the interpretation function of the model. The same goes for more complex expressions, such as sentences.
- 14 To illustrate what models are used for, note that, very often, linguists’ data concern structural ambiguities. For instance, an utterance of a doubly quantified sentence (*Every teacher likes a pupil*) is sometimes ambiguous between two scopal interpretations. These interpretations are, of course, distinct. Using model-theoretic apparatus, we represent the distinct scopal interpretations by interpreting the utterance as true in two distinct models. So, in order to be able to represent structural ambiguities we need two distinct models. If these models are extensions of a more minimal, initial absolute model, we can see them as absolute models as well. They will be part of the broad absolute model.

we are unable to substantiate formality and necessity claims about natural language expressions.

I shall argue that absolute semantics cannot deny us the legitimacy of utilising the resources to formulate logical statements without making further assumptions. In appendix F, I document three semantic solutions and a syntactic one. Here, I present the syntactic solution and a unique semantic solution, which inherits the essentials of the three semantic solutions. This semantic solution will surely run counter to the assumption of the argument from abstraction/idealisation. However, that assumption is equally problematic, as I shall show below.

The ways to define logical properties can be classified in two categories: semantic and syntactic. There are several options regarding the semantic definitions of the logical properties invoked by LNL, which follow from the definition of a model as a triple. The crucial ingredient shared by all these semantic approaches is the following. Insofar as we think that the space of models is doing important theoretical work in defining (logical) properties of natural language, we can use the model-theoretic apparatus to do so. However, there is a twist. We single out a specific model as representing the ‘real world’ denotations of the linguistic vocabulary. Everything beyond that model will not represent denotations of linguistic vocabulary but only structural properties that can be formulated using that vocabulary. The process of getting the space of models can be thought of as idealisation, but, as I shall argue, this does not prevent us from accepting LNL.

Abstracting away from the details, I contrast proof-theoretic systems and model-theoretic ones.<sup>15</sup> The former are syntactic, whilst the latter are semantic. The syntactic systems are, for instance, natural deduction systems, tree-based systems or axiomatic systems, which are all based on symbol manipulation. The semantic systems are based on the notion of interpretation in a domain of (various kinds of) objects and satisfiability of a formula in that domain. In a syntactic system, to check validity of a formula we check that formula using the established rules of deduction and further syntactic ‘indicators’ of validity (namely, the derivation of the formula from the axioms in the axiomatic system, or the derivation of a contradiction from the

<sup>15</sup> This is not the place to develop the distinction between ways of conceiving logic. See MacFarlane (2000, pp. 50–79) for discussion of three basic, and historically important, ways of defining formality or logicity. Roughly speaking, the first is one that sees logic as normative, the second is the model-theoretic one (permutation-invariance), and the third is the syntactic one. Insofar as these notions apply to logicity in natural language, the three-way distinction shows that the argument from absolute semantics has limited force, because, even granting that it succeeds to block the model-theoretic logicity, there would still exist two other ways in which to conceive logicity in natural language. Indeed, I just argued that a syntactic view of logicity is adequate for certain empirical problems. I shall argue later that LNL in the second sense (99), has something akin to the normative role of logic.

negated formula in natural deduction and the tree-based systems). In a semantic system, we check the validity of a formula by way of interpreting that formula in a domain, and, in particular, by trying to find a counter-model.

The ultimate aim of presenting the possible ways to define logical properties is to show that we can characterise the basic statements representing the logic of Binding Economy (i.e., the statements in (106) and (107)) as expressing genuine logical consequence relations, rather than other sorts of implication. These possibilities represent the ways in which we can circumvent the restrictive criteria of absolute semantics (at the same time preserving its non-relativist desideratum), and still get *bona fide* logical properties.

The semantic solution is compatible with the crucial requirement of absolute semantics, and fits well with our BE data above. The compatibility with absolute semantics is ensured by the fact that absolute semantics requires the semantics to privilege an absolute model, that is, a fixed domain and fixed interpretation function or valuation. But a model-theoretic view allows for semantic flexibility.

This is to say, even if we abstract away from the meanings of some expressions in a sentence, or even if we consider that these expressions have other meanings than they actually have, sentences that contain these expressions will still have some invariant properties. In other words, there is a class of sentences that will have the same extension (truth-value), no matter how we (uniformly and consistently) fix the extensions of certain words in contexts. This is, of course, a well known idea about the distinction between logical and non-logical properties, but the key point is that that distinction is compatible with absolute semantics. What absolute semantics requires is to privilege some model, which will be called *absolute* if it satisfies such and such intuitive criteria. A model-theoretic view is flexible enough to accommodate such a restriction. This flexibility is not an odd or quirky property of the model-theoretic view, but it is a natural property of a formal tool that can be adapted to our theoretical needs. Thus, absolute semantics, in many of its forms, is compatible with the semantic flexibility of a model-theoretic view.

But what if we define absolute semantics more strictly? It would be possible to reject the aforementioned semantic flexibility, and thereby contend that the semantics of natural language is not only absolute, but also *exclusive*. On the exclusive view, the semantic values (referents, extensions, properties etc.) of each expression that can be formulated in the vocabulary of the model can be interpreted in only one, fixed, way. This view is not appealing, since it seems to lack important theoretical resources, and its other theoretical or practical advantages are not clear. This may seem quick and question begging against the LNL sceptic. But it really is not, if we take the explanation based on binding economy at face value, as I think we should.

In order to distinguish between binding and coreference in a general manner, we need a logical system that would verify the equivalence between any binding and coreference forms, no matter what semantic values the binding expressions (viz. the potential binders and bindees) happen to get in the context. This logical system effectively abstracts away not only from the lexical material not relevant for binding theory, but also from the semantic values of pronouns and full noun phrases (e.g. proper names). The generality of the system rests on the fact that it computes equivalence regardless of the semantic values of the binding expressions, and irrespective of how we conceive of the nature of these semantic values, be they absolute or relative. That is, the generality of the system consists of its computing (or checking) logical equivalence.

However, if the advocate of absolute semantics thinks that no *semantic* resources are available to formulate such a logical system, absolute semantics, in the absolute semanticist's view, is not compatible with the binding economy account. To be more precise, if no relevant semantic resources are forthcoming on the absolute semantics thesis, it follows that absolute semantics is not compatible with the binding economy account (and with LNL) under a *semantic* understanding of these views, i.e., presuming that the logicity invoked by these views is semantic in nature. (As we shall see shortly, it is nevertheless possible to formulate binding economy and LNL in non-semantic terms.) But in fact absolute semantics cannot cut off the semantic resources needed for defining linguistic logicity, as it may appear at first glance. To see this, consider the following toy absolute/exclusivist semantics.

Consider, in particular, a language with two individual constants  $a$  and  $b$  standing for Ann and Bill, the only people in the domain  $D$ , and two predicates  $S$  and  $R$  standing, respectively, for individuals who swim and individuals who read in the domain. We also know that Bill both swims and reads, while Ann swims. In short, our absolute/exclusive semantics has it that  $I(a) = \text{Ann}$ ,  $I(b) = \text{Bill}$ ,  $I(S) = \{a, b\}$  and  $I(R) = \{b\}$  (where  $I$  is the assignment function). Now, consider the following sentences.

113. Everyone who swims and reads reads.  $\forall x((Sx \wedge Rx) \rightarrow Rx)$

114. Someone both swims and reads.  $\exists x(Sx \wedge Rx)$

Both sentences come out true, or are satisfied, in the absolute model  $M, \langle D = \{a, b\}, S, R, I \rangle$ . But, importantly, there is still an important difference between how the two sentences behave in this model. In particular, (113) is true in every sub-model of the absolute model, whilst (114) is not. That is, (113) is true in  $\langle D' = \{a\}, S, R, I \rangle$ ,  $\langle D'' = \{b\}, S, R, I \rangle$ , and  $\langle D = \{a, b\}, S, R, I \rangle$ , whilst (114) is false in  $\langle D' = \{a\}, S, R, I \rangle$ , because Ann does not read in the interpretation provided by the absolute model (an interpretation preserved in the sub-model).



In other words, only (113) is *valid* in the space of sub-models of the absolute model.

We should note that the sub-models are defined by taking sub-domains of the absolute domain, preserving the behaviour of the interpretation function  $I$  on this sub-domain in the sense that  $I$  will continue to map  $a$  to  $Ann$ , and  $Ann$  will still be in the extension of the predicate  $S$  on this interpretation. It is true that the extensions of predicates will be different on the different sub-models, but it is important that the sub-models get the relevant facts right, so to speak. In particular, no individual will be assigned the wrong properties:  $Ann$  continues to be a swimmer, and  $Bill$  continues to be a swimmer and a reader in every sub-model in which such individuals exist. Otherwise put, the sub-models are faithful to the absolute model, and in virtue of this fact they may be called ‘absolute’ as well.

To see what is the significance of validity in the space of sub-models generated by  $M$ , consider alternative models to  $M$ . There are two important types of alternative models: ones that are isomorphic to  $M$ , and ones that are not isomorphic. An isomorphic model is one in which we swap the values of  $I$  for the arguments  $a$  and  $b$ , so that  $a$  will denote  $Bill$  and  $b$   $Ann$  (leaving everything else the same). A non-isomorphic model is, for instance, one in which we add another object in the domain of the absolute model, say,  $Chris$ , extending the interpretation function appropriately such that  $I(c) = Chris$ . Arguably, in any type of alternative model, (113) remains valid and (114) remains invalid—precisely as they are in the absolute model  $M$ . This suggests that we only need a restricted space of models to define the validity of sentences such as (114), and, crucially, that the absolute model can provide us with the necessary resources to produce the required space of models. Therefore, the space of sub-models of the absolute model  $M$  is representative for a larger space of models, and certain logical properties in the former will carry over to the latter. In order to define logical properties for certain natural language statements we need not look any further than the absolute model, since the absolute model implicitly contains all the semantic resources needed in order to assign validity to these sentences.<sup>16</sup> Hence, the moral of this toy example is that absolute, and even exclusive, semantics is sufficient for offering a notion of logicity in natural language, and that no extra-resources (viz. no non-absolute models or models that are unfaithful to the absolute model) are needed in order to be able to attribute validity to certain statements in natural language.

<sup>16</sup> Of course, this is not to say that absolute sub-models will preserve all the properties definable in the absolute model, or in any other model. For instance, the sentence *Only Ann swims* will be true in the sub-model  $\langle D' = \{a\}, S, R, I \rangle$ , but false in  $M$ . So the satisfaction of this sentence will not be preserved in the space of sub-models, but, then, we wouldn’t consider this sentence logical in the first place. In general, such sentences are contingent, and their satisfaction conditions will not be matters of logic.



There is yet another crucial point in favour of LNL. Note that although exclusive semantics would block our semantic approach to defining logical properties, it is inoffensive regarding the proof-theoretic (syntactic) solution. But the proof-theoretic solution is a perfectly adequate candidate for logicity in natural language. The reason why Glanzberg ([forthcoming\[b\]](#)) has not considered this way to meet the challenge to LNL is perhaps the following. The mainstream formal semantics is model-theoretic, and, according to this reasoning, semanticists could not propose non-model-theoretic solutions. A further assumption that could seem to reinforce this point is that the main task of semantics is to state truth-conditions. But this reasoning is not entirely accurate. Firstly, for certain empirical problems, special formal tools may be needed. So we are not stuck with model theory, and much more flexibility in using formal tools is shown by formal semantics and linguistic theory in practice. Secondly, although Glanzberg is surely right that the main task of (at least mainstream) formal semantics is to state truth-conditions, this doesn't mean that auxiliary hypotheses not involving truth-conditions (but otherwise compatible with the main task of looking for the right truth-conditions) cannot be formulated. In fact, for linguists working at the interface between syntax and semantics, non-model-theoretic, logic-based, hypotheses would do the same job as the model theoretic ones. Binding Economy is a case in point.<sup>17</sup>

There are two methodological desiderata following from our decision to stay close to the empirical investigation of language. The first is that the question of logicity is a local one, tied to the particular fragment of language under investigation. The second is that there are multiple formal tools that are used in studying fragments of language (specific linguistic phenomena). To these linguistic methodological desiderata I add a philosophical-logical one. There is no need to reject pluralism about the ways to conceive logical consequence (syntactic, semantic) out of hand. There are many ways to capture an intuitive notion of implication, and the syntactic one is certainly among the formally most sophisticated and clear. Moreover, there is a pretty straightforward (local) relation between the deductive notion of consequence and the inferential relation between sentences in natural language (Shapiro [2002](#), 236ff.). As we hinted, only if we also

<sup>17</sup> Interestingly, one of the proponents of economy principles, Fox ([2000](#), p. 68) suggests a deductive system by whose proof theoretic computations, certain syntactic operations and structures are ruled out as ungrammatical in case the deductive system proves that the specific structures are not logically equivalent. According to Fox, the structures are part of a very constrained, modular deductive system, i.e. a system that does not take in consideration any sort of logically-looking constructions whatsoever, but only constructions of a very specific form. The deductive system is then sensitive to a 'logical-syntax' which consists of quantifiers, modal/intensional operators and variable binding operators. (See Reinhart [2006](#) for a similar proposal.) Moreover, on the philosophical side, MacFarlane ([2000](#), pp. 195–6) reports that Evans ([1985](#)) made a similar suggestion (based on different data).

want to take into consideration the semantic notion of consequence, the soundness and completeness theses become interesting insofar as support for LNL is concerned.

I conclude that Binding Economy combined with the proof-theoretical solution make a serious case for LNL. The argument from absolute semantics fails to challenge LNL, if we define logicality proof-theoretically. LNL is supported by the empirical hypothesis that binding economy phenomena are sensitive to logical properties under a syntactic understanding of logicality.

What about the semantic version of LNL? My contention is that the argument from absolute semantics also fails to challenge the semantic solution above. It cannot do so without further assumptions, which would turn absolute semantics into *exclusive* semantics. The exclusivist assumptions that might be brought up to support the argument from absolute semantics against LNL are the assumptions of the argument from formality (logical constants), and of the argument from abstraction and idealisation. I turn next to these arguments. Since they both support exclusivism, I will call the opposing view, which is the one I favour, *liberalism*.

So, to take a broader perspective on the semantic positions regarding logicality in natural language, the two opposing views that emerge are the following.

115. *Exclusivism, against LNL*. Logicality (constants, consequences, validity) is defined in terms of invariance of semantic value under permutation of models. But natural language has only one model – an absolute and exclusive one. Therefore, natural language lacks all the core logical properties. We could get logicality only by abstraction from the absolute and exclusive semantics, and further idealisation, but the result of abstraction and idealisation does not reflect properties of language.
116. *Liberalism, pro LNL*. Logicality may indeed be an invariance property. Moreover, natural language is flexible enough to ‘see’ a space of models, although only one such model is privileged or absolute. Therefore, at least some linguistic constructions can be partitioned into logical (valid) and non-logical (contingent), and doing so is sometimes useful for empirical purposes.

I shall refine the two positions in light of the features of LNL scepticism that will be shortly discussed.

### 5.3.3 Discussion of the argument from formality

The argument from formality can be stated as follows.

117. **The argument from formality**: Natural language does not isolate for us pure logical forms (and logical constants), i.e., forms

that would permit us to study the logical properties of language, e.g., validity of natural language inferences, as opposed to the non-logical properties of language. (cf. Glanzberg [forthcoming\(b\)](#), Szabó [2012](#))

I don't find the argument from formality convincing. It is true that natural language does not isolate a stock of logical constants for us. Some tentative identification or choice of constants is needed. This, I claim, is not a problem for the linguistic theorising that relies on logical properties. The identification of logical constants should be regarded, broadly speaking, as an empirical problem. (The situation is hardly different from what happens in other sciences, which must choose their own ontologies.) We have (overt or covert) expressions and lexical items that seem *prima facie* to have logical behaviour: conjunction, disjunction, quantifiers,  $\lambda$ -operators etc. (For instance, our BE implementation employs at least two logical constants, = and  $\wedge$ . These are the logical constants that linguistics should postulate, in our case.) It is these expressions which support the idea of a formal aspect of natural language sentences, and ultimately LNL.<sup>18</sup> Indeed, on a semantic account of LNL, we have to check, using linguistic tests, whether they have the required invariance properties. And more importantly from an empirical perspective is what sort of invariance properties they have. Once we identified some invariance properties (e.g. truth-preservation), we thereby showed that the corresponding linguistic constructions do have logical behaviour. Hence, the stipulation (or identification) of logical constants *per se* is not problematic, as long as there really are properties that justify the classification of certain expressions as, in some sense, constant or invariant. In the practice of linguistics, there is no insurmountable problem with identifying formal properties. In effect, several proposals of what these formal properties are have been put forward. See Keenan ([2001](#)) and van Benthem ([1989](#)) for formal arguments that many expressions of natural language are logical constants.<sup>19</sup>

<sup>18</sup> Nothing in the present argument relies on all the logical constants being part of the syntactic, object language, although some will definitely be part of syntax (e.g. conjunction). (For instance,  $\lambda$  operators may not be assumed to be part of natural language syntax.) But logicity is a global property of a linguistic system, and as such it can be uncovered even by using logical constants in the semantic, metalanguage. Otherwise put, the language should be logical in order to be able to employ logical constants in the metalanguage the way we employ them. Thus, our discussion pertains, for the most part, to the semantic properties of language and does not make contentious assumptions about the syntax. (Note, in particular, that our implementation of BE is not meant to be faithful to the linguistic syntax of some natural language sentences, but rather it is meant to be faithful to the logical properties needed to get the BE principle off the ground.)

<sup>19</sup> There is a further apparently problematic issue about formality and logic here. We might have some very specific logical behaviour in mind when looking for logical constants in natural language. For instance we may take as prototype of logicity first order logic. But I see no reason to stick with any pre-conceived notion of logic.

The logical constants in natural language are supplied by the so called *functional items*, e.g. determiners (*all, some, the*), conjunctions (*and, or*), tense inflections (third person singular *-s*, future marker *will*) etc.. Functional items are a closed class, in the sense that competent speakers cannot invent and then adopt new functional items. While there are many noun phrase neologisms that get into circulation every year, this is not so for functional items. As many theorists remarked, it is in effect very difficult to get in circulation a simple conjunction for something like the NAND operator. (This operator, also known as the Sheffer stroke ( $\uparrow$ ) is a conjunction that makes a sentence  $p \uparrow q$  true iff at least one of the conjuncts  $p, q$  is false.)

A worry about functional items is that there is no clear and general criterion that distinguishes them from other lexical items. But the lack of such a criterion should not deter us from giving a plausible semantics for a language consisting of a subset of such items (cf. Chierchia 2013, p. 52). In particular, the lack of a criterion for functionality should not deter us from taking the semantics of some functional items to give us a class of logical consequences. Therefore, I see no reason for scepticism towards picking out logical constants.

Szabó (2012) puts forward a triviality objection against distinguishing between formality and truth-regarding facts. Although he does not assume absolute semantics, his argument denies the formality property of natural language inferences. It is thus an argument against LNL, in a more general form (which needs not tie logicity to model-theoretic assumptions). The argument purports to show that we cannot really separate between truths in virtue of form and truths in virtue of facts. Indeed, Szabó (*ibid.*, 135ff.) claims that the following example shows that formal truths depend on factual truths:

118. a) *Context*. The speaker felicitously asserts the valid argument “Alex is a father; therefore, Alex is a father or a mother” and then goes on as follows.
- b) ??Never mind whether every father in fact is a father or a mother. My assertion of “Alex is a father; therefore, Alex is a father or a mother” is true in virtue of its form.

The infelicity of (118b) suggests, *pace Szabo*, that formal truths and factual truths cannot be independent, and thus, plausibly, the formal validity of sentences such as “Alex is a father; therefore, Alex is a father or a mother” depends on facts. However, it is clear what we may say to explain away the infelicity from the perspective of a model-theoretic approach to logicity. The first sentence in (118b) (the one starting with *never mind . . .*) presupposes that “Alex is a father; therefore, Alex is a father or a mother” is falsified in some model (i.e. has

---

Logic may legitimately be conceived as an empirical discipline. I shall return to this issue in the concluding remarks.

true premises and false conclusion in that model), whilst the assertion of the inference itself rules out a falsifying model. Szabo anticipates such an answer and retorts that even if such a presupposition account of the infelicity is right, we can factor out the presupposition and the assertion above would still sound odd. But if we somehow cancel out the presupposition, the sentence ends up sounding fine (although pragmatically odd). The sentence would say something to the effect that some facts are thus and so, but that there is an independent formal truth (that does not depend on the facts). Setting aside the cancelling out of the presupposition, cases like (118b) are more likely to show that sometimes we can felicitously infer from factual truths to the invalidity of some alleged truths in virtue of form. These inferences are exactly what we would expect if LNL were true.

As Szabo himself points out, it is safer to assess the logicity of natural language relying less on informal notions (e.g. factuality, formality) and more on better understood theoretical notions. He calls the ensuing thesis (p. 120) *the linguistic version of logical form*, and he argues against it by putting forward, *inter alia*, an argument from idealisation (see below). I myself argue here for a linguistic version of LNL from binding data. However, it is worth stressing that LNL is not identical to the linguistic version of logical form, in the version originally conceived by Szabo. The logicity I argued for is *not* compositional, in the sense that the BE mechanism is a restricted mechanism functioning in parallel with (or independently of) the compositional mechanism. So the BE hypothesis involves a much more limited form of logicity than the kind of logicity Szabo targets, and thus remains untouched even if Szabo's arguments succeed. The linguistic version of logical form (against which Szabo argues) asserts that logicity follows from compositional semantics. I think that this thesis too is preferable to the one denying that natural language has logical properties. However, to defend this more general thesis is to defend LNL in its second sense (99), that is, as a thesis that is desirable for its economy in using theoretical resources, as well as being more compatible with some 'big facts' about linguistic competence (e.g. systematicity).

So, if our logical implementation of the Binding Economy principle is on the right track, we have an argument for a linguistic version of LNL, one that has no formality-problem. Its formality follows from the logical structures that most plausibly account for the linguistic phenomenon. Thus, formality is an empirical consequence of the best account of the linguistic phenomena in hand (in our case, binding economy phenomena).

#### 5.3.4 Discussion of the argument from abstraction and idealisation

The argument from abstraction and/or idealisation is the following.

119. **The argument from abstraction and idealisation:** Natural language semantics has as its main job to state the truth-conditions of natural language sentences. Another possible job is to abstract and idealise away from its primary empirical domain, and talk about some abstract properties of the system developed when doing empirical work. But logical properties seen from the meta-level are relative to our mathematical or logical point of view, and the idiosyncrasies of the meta-language. In any case, what we do not get is the real logical properties of natural language. (cf. Glanzberg [forthcoming\(b\)](#), Szabó 2012)

To begin with, I propose a working definition that distinguishes between abstraction and idealisation. Abstraction is the process of removing some details from the description of a phenomenon (these details correspond to some real properties of the object described that are deemed nevertheless irrelevant). Idealisation does not consist in removing details, but sometimes it actually implies adding details in the description, such that the description says false things about the object. It says false things, but it also says some true things that are really important.

We can look at the issue about abstraction and idealisation in linguistic semantics from the following perspective. The bone of contention between exclusivism and liberalism is to choose among the following three pictures:

120. The absolute model  $\mathcal{M}_a$  consisting of the pair of absolute domain and absolute valuation  $\langle D_a, I_a \rangle$  is primitive. We get other models by generalising or abstracting away from the valuation  $I_a$  thus obtaining the space of valuations  $F$ , which in turn determine a space of possible models. We then can go on and check/define our logical properties, but these will not be linguistic properties (*Exclusivism*)
121. We start with a space of models as primitive, and get the absolute model—by some sort of idealisation—by choosing one of them as privileged. (*Extreme Liberalism*)
122. It is fine to assume, with the exclusivist, that there is an absolute model  $\mathcal{M}_a$ , and that the model is primitive. But the derived models are equally important for linguistics in general, and for linguistic semantics in particular. Therefore the derived space of models is empirically relevant. (*Liberalism*)

We may recognise these positions as extensions of the liberal and exclusive theses defined in (115)–(116). What has changed is that we distinguish between two versions of liberalism, weak and strong (or extreme). It is the weak version of liberalism (henceforth, simply *liberalism*) that I endorse, on the assumption that model-theoretic semantics is on the right track. (I think that Extreme Liberalism is not far

from the truth, but assuming it here in order to argue for LNL would amount to begging the question against the absolute semanticist.)

It might seem that no empirical data are able to discriminate straightforwardly between the exclusivist and extreme liberalist proposals and so conceptual criteria should be brought in to decide between the two views. In a sense, both exclusivism and liberalism idealise the linguists' practice and speakers' linguistic behaviour. In practice, linguists do not specify a unique absolute model but rather sub-models (or perhaps restricted extensions) of an absolute model. Nor do speakers talk about the whole universe of discourse, or about the same universe of discourse at every time. So, absolute semantics is itself an idealisation/abstraction from linguists' and linguistic practices. On the other hand, a space of valuations cannot be read off of the linguistic practice either. Given that both exclusivism and liberalism misrepresent language in some sense, it might seem better to choose a simpler view, along the lines of absolute semantics (because it involves only one model). But there are both empirical and conceptual reasons for preferring the middle position, the liberal version, which allows a version of LNL to go through. This is in part because it accounts more straightforwardly for empirical data presented above, and also because it has conceptual advantages.

Supporters of exclusive semantics (and model-theoretic definitions of logicity) do not seem to acknowledge that the case against LNL rests on the kinds of assumptions presented above in (120). Arguably, they claim that LNL is false, on the basis of distinctions that implicitly take one of the exclusivist assumptions for granted.

Michael Glanzberg's appeal to the distinction between local and global quantifiers is a case in point. He writes:

Attending to the local versus global distinction, we can reconcile two facts that might have seemed in tension. First, familiar determiners in natural language have more or less the semantics that logical theory says they should. [...] But the reason is simply that semantics of natural language uses local properties of quantifiers in spelling out the semantics of determiners. These are already available to absolute semantics.

Now, this does not mean we can never look at the global notion of quantifier in thinking about natural language. The basic idea for giving absolute truth-conditions is the local one, and in fact, sometimes we can get interesting further results out of local definitions. But on occasion, we learn something by abstracting away from absolute truth conditions, by looking at global generalized quantifiers [...] natural language determiners express restricted quantification.



In looking at this sort of global property, we are not simply spelling out the semantics of a language. Rather, we are abstracting away from the semantics proper – a specification of contributions to truth-conditions – to look at a more abstract property of an expression. It turns out, in this case, abstracting away from the universe of discourse is the right thing to do. Particularly when asking about logical or more generally mathematical properties of expressions, this sort of abstraction can be of great interest [...] even if it goes beyond the semantics of any language per se.

This sort of possibility shows how we might take the step from semantics proper to logic [...] Glanzberg ([forthcoming](#)[b], pp. 32-33)

The basic idea of the passage is the following. There is a distinction between local and global quantifiers, which solves a certain tension. Otherwise put, the locality and globality are properties of the very same expressions, viz. the quantifiers (as Glanzberg suggests in the third paragraph). The whole argument rests on the assumption that when we are doing linguistic semantics, we focus exclusively on local properties (secured by absolute semantics), and thus that global properties are quasi-irrelevant for semantics.

I think that this assumption—to the effect that grammar is not sensitive to global properties—cannot be true as it stands. A relevant piece of data is the following. Downward monotonicity is clearly a global property: it requires that in every model subset-inferences hold (cf. [appendix A](#) on monotonicity). For instance, assuming that the conditional *If you are student at UEA, you get a library card* is true, a similar conditional will be true of a subset of the students at UEA, say, the doctoral students at UEA: *If you are doctoral student at UEA, you get a library card*. It is a well known fact that negative polarity items are sensitive to downward entailing environments (see e.g. [Chierchia 2013](#)). For instance, the negative polarity item *any* does not appear in upward entailing environments but only in downward entailing ones. That is why *If any UEA student exists, she will have a library card* is acceptable, whilst *\*Any UEA student exists* is not. Note that the acceptability of negative polarity items only in downward entailing environments is robust: the scope of negation gives rise to precisely the same type of subset-inference as the antecedents of conditionals (exemplified above) do. Thus, the negative polarity item *any* is acceptable in *I don't have any money on me*, whilst it does not sit well with assertions: *\*I have any money on me*.

The critical point is that downward monotonicity is not a content-related properties. It does not depend on the specific semantics of words (or lexical items) such as *student*, *UEA* etc.. Downward monotonicity is a property that depends on the *semantic relation* between

phrases such as *student* and *student at UEA*, rather than on semantic values of these phrases themselves. For instance, *student* and *UEA* can be replaced by other arbitrary words, say *pupil* and *Eaton*, preserving the semantic relation between the resulting phrases. If downward monotonicity were tied up with the semantics of such words as *student* and *UEA*, it would stop being a general property. Then, the patterns of acceptability that we observe in constructions involving negative polarity items would not be general. But downward monotonicity and the patterns of acceptability of negative polarity items *are* general. I have shown that the resources of absolute (and even exclusive) semantics are sufficient to define logical properties such as the validity of certain simple quantified sentences, and the same remark carries over to downward monotonicity, since this property too is an invariance property that can be defined on a space of absolute sub-models.<sup>20</sup>

Unless the exclusivist semanticist finds a way to define downward monotonicity (or a notion that does the same job) even more locally, we have reason to think that (at least some types of) global properties are empirically relevant for linguistic inquiry. There are further empirical reasons to think that grammar is sensitive to global properties, but, for now, let us get clear about the entire dialectic of the argument from abstraction and idealisation, and the role that the distinction between local and global properties of quantifiers plays in this argument.

Glanzberg identifies a tension, which he characterises as following from the striking resemblance between some features of the quantifiers in logic and in natural language respectively. On this view, which I assume here as well, this similarity is due to the fact that both types of quantifiers have the same *local* properties. However, the real tension, it seems to me, appears when we ask about the *global* properties of quantifiers in logic and in natural language. Are these global properties the same or not? The answer provided is nuanced. On the one hand, the semantics is absolute (read ‘exclusivist’), which, according to the argument from absolute semantics, makes talk of global properties (viz. invariance properties defined over a space of models) impossible at the level of semantics. Thus, quantifiers *do not have global (logical) properties at the semantic level*. On the other hand, Glanzberg says that even if only the local properties of quantifiers are available to absolute semantics, “this does not mean we can never

<sup>20</sup> To do so, the crucial step is to interpret the predicates *S* and *R* in our toy absolute semantics as sets of students and sets of students at UEA, thus ensuring that  $R \subset S$ , and add a further predicate *C*, denoting the set of individuals in the domain owing a library card. Then, we can check that  $\forall x(Sx \rightarrow Cx) \models \forall x(Rx \rightarrow Cx)$  holds in all the sub-models of our toy semantics. If this comes out as valid, we can capture it within an absolute semantics. To repeat, this is empirically desirable, since, otherwise we would be in the position of not being able to explain the patterns of acceptability of e.g. NPIs.

look at the global notion of quantifier in thinking about natural language.” He adds that we “can get interesting further results out of local definitions” by abstracting away from absolute semantics (and its corresponding universe of discourse), in particular, results about “abstract proper[ies] of expression[s]”, or “about logical or more generally mathematical properties of expressions.” Thus, quantifiers do get global (abstract, logical) properties at a level that “goes beyond the semantics of any language per se.” So, *pace* Glanzberg, quantificational expressions in natural language lack logical properties at the semantic level but have those logical properties at some post-semantic level.

I think that the real tension comes from talk about properties of expressions at two levels, levels whose very characterisation rests exclusively on one’s view of semantics: liberal or exclusive. Indeed, Glanzberg’s appeal to absolute semantics is an implicit endorsement of exclusivism. Recall that liberal semantics does not deny, and in fact agrees with, the core motivation of absolute semantics, that is, the adequacy constraint on linguistic theorising to the effect that expressions have their objective, worldly content, but also claims that this adequacy constraint does not exhaust the resources of linguistic semantics. Thus, the exclusive semantics is a somewhat dogmatic and stipulative position about the bounds of linguistic semantics. (From this point of view, its apparent defect is that it lacks independent motivation.) It is worth registering that LNL is a thesis about natural language in general. If one wants to have an exclusive view of semantics, one can still maintain that linguistic expressions have logical properties at other levels. What is important for the LNL supporter is that logical properties *are* realised by natural language, and this counts in favour of LNL irrespective of how we draw the boundaries between the semantic and non-semantic levels (interface and post-semantics). Liberalism, by definition, is not tied up with the restrictive view about semantics, and allows for the model-theoretic apparatus to be used to represent ‘modules’ of the grammar other than semantics (in the exclusivist view).

But if the exclusivism underlying the argument from absolute semantics takes pride of place in arguing against LNL in semantics (but not, as we have seen, in grammar, more broadly speaking), what is the force of the argument from abstraction and idealisation against the model-theoretic version of LNL as a general thesis about language? In the last paragraph of the passage above, Glanzberg suggests that by abstracting away from absolute semantics, we “take the step from semantics proper to logic.” A lot depends on how “logic” is understood. Does the logic, as invoked in this argument, have some empirical content? Does it represent properties of language? If the logic has empirical content, this establishes LNL in the ‘compromise’ version presented above (granting exclusivism about semantics, but

placing logicity at some post-semantic level). This would be a *weak* version of the argument from abstraction and idealisation. But if the claim is that in moving to logic, we lose the empirical content about language altogether, the argument from abstraction/idealisation invoked by the LNL sceptics, I shall argue, does not adequately justify this claim. This argument, which I oppose, would be a *strong version* of the argument from abstraction/idealisation. So my pro-LNL position will be this. The argument from idealisation and/or abstraction, in either its strong or weak version, cannot achieve anything beyond what was already achieved by exclusivism. Moreover, I think that the LNL sceptics overstate the case against LNL made by this argument, if the argument is intended in its strong sense. The first claim follows from our discussion of exclusivism underlying the use of the distinction between local and global properties of quantifiers. In the remainder of this section, I shall argue for the second claim.

Glanzberg may not maintain the strong version of the argument from abstraction and idealisation.<sup>21</sup> However, it is plausible that he should maintain it, as long as he takes his position to undercut the LNL thesis in all its versions, in particular the interface version, supported by Binding Economy under a semantic definition of logicity. Provided that he needs the strong version to effectively argue against LNL, I assume that he does endorse it. The following passage from Glanzberg may serve to settle the issue of the strength of the strong version of the argument from abstraction and idealisation.

Idealization, as it figures here, is a familiar kind of idealization in scientific theorizing, that builds idealized models. One way to build idealized models is to remove irrelevant features of some phenomenon, and replace them with uniform or simplified features. A model of a planetary system is such an idealized model: it ignores thermodynamic properties, ignores the presence of comets and asteroids, and treats planets as ideal spheres (cf. Frigg and Hartmann, 2009). When we build a logic from a natural language, I suggest, we do just this. We ignore irrelevant features of grammar, and replace them with uniform and simplified logical categories. We do so for particular purposes. [...]

Thus, we need to add a process of idealization to those of abstraction and identification. We need all three to get from natural language to logic. We only get to logic –

<sup>21</sup> The fact that he talks about “logical or more generally mathematical properties of expressions” (see the passage quoted above pp. 32–3) suggests that he does not endorse the strong version, since the logical properties in question presumably are properties of *linguistic expressions*; but the fact that he presents logic as the study of valid reasoning (see quotation below), without mention of linguistic competence, suggests that for him logic does not have empirical content as far as linguistics is concerned.

something that serves our purposes in analyzing valid reasoning, and is recognizably like what logicians work with – when we include idealization. Glanzberg ([forthcoming](#)[b], p. 48)

So Glanzberg presents us an interesting analogy between the model-theoretic account (or the logic) of certain linguistic expressions, e.g. quantified expressions, and scientific models, as treated in the general philosophy of science. Assuming that the analogy is on the right track (which is not clear, as we'll see below), we reach the previous decision point. If the underlying argument is a weak version of the argument from abstraction and/or idealisation, it is just a restatement of exclusivism, as argued above. But what if it is intended as a strong version?

If indeed we are dealing with the argument in its strong sense, it has an implicit assumption about idealisation, which is problematic.<sup>22</sup> The implicit assumption is that models, by idealisation and/or abstraction completely lose their grip on reality. But such an assumption is very contentious, since it is a mainstream (realist) position that idealised models, even after abstracting away from some features of reality, still can track core features of reality (i.e. of phenomena or of data), and thus can be (at least approximately) true about the world. Otherwise put, it is a standard assumption that models represent their target systems, or that in using models we learn about target systems (see Frigg and Hartmann [2012](#)). After all, borrowing Glanzberg's analogy, it is not at all obvious that a model of a planetary system that ignores such and such properties of planets is completely misleading in representing the world, and, more specifically, the physical properties of the planets. It can still get some relevant facts right. For instance, it can still represent correctly the movement of planets, their trajectory and speed, in the (possibly counterfactual) case in which no asteroids interfere with the planetary system. The same holds, *mutatis mutandis*, in the linguistic case. No reason is given for thinking that in moving away from absolute semantics the logical properties of expressions that we thus get are not properties with which grammar endows such expressions. On the contrary, it seems that in appealing to the abstract tools of model-theory we discover important properties of linguistic expressions.

<sup>22</sup> It is worth pointing out that this brings us in a difficult area pertaining to idealisation in science. We cannot do justice to the discussion of idealisation in philosophy of science. Moreover, the analogy between the discussions of idealisation in the philosophy of science and in the philosophy of linguistics is very difficult to draw precisely. This is because we don't yet have a clear and independent understanding of what to take as the target system of linguistics, that is, what sort of features of reality realise linguistic properties. (We do get an independent target system with the model of planetary motion, since the planets are independently observable.) With this caveat in place, let us go back to the strong version of the argument from idealisation.

There are further problems with the above analogy between the role of model theory and the role of the idealised model of planetary motion. I find that this strategy of the argument from abstraction and/or idealisation doesn't fit too well with the way the notions are conceptualised in philosophy of science.<sup>23</sup> There are two reasons for this.

Firstly, both abstraction and idealisation are conceived as kinds of distortion by either *simplifying* a model—*qua* scientific model—in order for the target system to become computationally tractable (Galilean idealisation) or by ignoring everything except for the core causal factors responsible for a phenomenon (abstraction). Both kinds of idealisation involve a simplification of the model-theoretic apparatus used, rather than the introduction of new theoretical material. But Glanzberg's use of idealisation and/or abstraction in linguistics assumes that the two actually add theoretical material, so they amount to *complications* of the scientific model. This is because we basically add a space of models—*qua* mathematical structures, rather than scientific models—to the absolute one, and this cannot be seen as a simplification of the model—*qua* scientific model. So, if idealisation and abstraction involve simplification, model-theoretic semantics cannot be obtained by idealisation or abstraction. Secondly, Glanzberg's argument from abstraction and/or idealisation (from absolute truth-conditions) also suggests a change in subject matter rather than a simplification. We move from local (content-related) properties to global (logical, content-independent) relations. But then the analogy with idealised models in science does not fit the linguistic case, because in the scientific models' case we do *not* change the target system. Rather we make simplifying assumptions about it. Thus, an important drawback to conceiving of idealisation and abstraction in this way is that, on this conception, the bridge between local (content-related) and global (content-independent) properties of language remains problematic. How could we legitimately state that the global properties of quantifiers are properties of the very same things that have such and such local properties in natural language, if the idealisation story fails? It becomes appealing not to suppose that there is a gap between local and global properties in the first place. Moreover, the problematic character of idealisation in linguistics also indicates that the general point against LNL crucially rests on exclusivism.

But perhaps there is a way out of the idealisation predicament for the LNL sceptic. A third possibility is that the simplification specific to idealisation takes place at the level of *syntax*, or perhaps at some other non-semantic level. Indeed, this seems to be suggested by

<sup>23</sup> See Frigg and Hartmann (2012) which is the same source that Glanzberg cites (updated with material that does not affect the present discussion) and also Weisberg (2007), for two articles on notions of idealisation in science.

Glanzberg ([forthcoming\[b\]](#), p. 46), which gives the following examples to illustrate his point:

123. *Distributional differences between every and a*
- a) Max is a friend of mine.
  - b) \*Max is every friend of mine.
  - c) There is a book on the table.
  - d) \*There is every book on the table.
124. *Scopal differences between every and a*
- a) John did not read every book. *non-ambiguous*
  - b) John did not read a book. *ambiguous*

The key idea is that in saying that the quantificational determiner *every* expresses the universal quantifier  $\forall$ , and that the indefinite determiner *a(n)* expresses the existential quantifier  $\exists$ , we are abstracting away from the syntactic differences (or differences of other nature) between how these expressions function in natural language, and how they function in, say, first order logic.

However, the existence of syntactic quirks of logical words in natural language is perfectly compatible with their having logical properties similar to the logical properties of the corresponding constants in logic. What such examples show is that the class of consequences in natural language will differ from the class of consequences in some system of logic. But this is to be expected. What the argument from abstraction and/or idealisation is supposed to show is that there is *no* overlap between the class of logical properties in natural language and the class of logical properties in some standard logical system. For instance, a supporter of LNL will be happy to accept the distributional differences presented in (123), but still maintain that the argument *Every book is on the table; therefore, a book is on the table* is valid in both natural language and first-order language under some assumptions (e.g. non-empty domain). Consequently, abstracting away from syntactic features should not lead to the abandonment of the LNL thesis.<sup>24</sup>

<sup>24</sup> This also raises the question as to what is the precise view of logic one assumes in order to compare logic and language. Glanzberg points out that we can take a more permissive view of logic as the basis for logicity, but this would make the LNL much weaker and uninteresting. However, there is a problem with the dialectical use of the permissive view of logic. The permissive view of logic was defined as accepting non-classical views of consequence (logicity), but it ends up being a liberal view about the syntactic and semantic mismatches between logic and language, mismatches that do not directly concern logical consequence (cf. Glanzberg [forthcoming\(b\)](#), pp. 9-10, 47). In any case, it doesn't seem to me to be an uninteresting conclusion that which establishes that the logicity in natural language is non-classical. However, the view that there are syntactic mismatches between first order logic and natural language is well known, thus not surprising – see e.g. Barwise and Cooper (1981).



There is yet another gap in the argument from abstraction and idealisation based on the examples in (123). Interestingly, it is arguable that Glanzberg's examples (124), under a certain linguistic analysis, militate in favour of the logicity of natural language, rather than posing a problem for it. In connection with the contrast shown in (124), the key question is why the indefinite quantifier phrase *a book* can take scope over the negation, whilst the universal quantifier phrase *every book* cannot do so? One plausible answer is that there is a syntactic constraint (or a set of syntactic constraints) that makes such scopal behaviour possible (cf. Beghelli and Stowell 1997). Another plausible answer is that a semantic principle is responsible for that distributional contrast. That is, two operators cannot enter in scopal interactions if the interpretation resulting from their interaction (i.e. from the inverse scope reading) is logically stronger than the interpretation resulting from lack of interaction (i.e. from their surface scope reading). This latter hypothesis explains the data in (124b): when the universal crosses the negation, the resulting, inverse scope, reading entails the surface scope reading, but when the existential crosses the negation, the resulting inverse scope reading is not stronger than the surface scope reading. Indeed, this principle is yet another economy principle, similar to Binding Economy.<sup>25</sup> What is important for present purposes is that explaining some scope phenomena makes appeal to logical properties (entailment or semantic strength), and thus that LNL is an empirical thesis that might help explain puzzling linguistic facts.

Moreover, Barwise and Cooper (1981, 182ff.) explain the contrasts in (123c)-(123d) by appeal to logical (global) properties, rather than to syntactic constraints. Thus, the ungrammaticality of Glanzberg's data (123c)-(123d) can also be traced back to logical properties. Here is how this is done. We define strong determiners as those determiners *D* for which every restrictor *A* in the domain *E* is such that  $A \in D(A)$  in every model  $\langle E, \mathbb{I} \rangle$  (where *E* is the domain of individuals and  $\mathbb{I}$  the interpretation function). That is, a determiner is strong if the generalised quantifiers (viz. sets of sets) that it determines contain the restrictor in every model. Those determiners which do not have this property are weak.

We observe that only strong determiners are allowed in *there is/are* constructions. For example, *every* is a strong determiner, whilst *some*, *a*, and *no* are not. (Cf. *\*There is every book on the shelf*, *There is a book on the shelf*; see also (123c)-(123d).) Roughly speaking, strong determiners give rise to generalised quantifiers (sets of sets) which contain among their members the whole domain of discourse *E* of the model. But only *every* is such a determiner, since, say, *every book* is bound to contain the entire domain of books (in every model). In

<sup>25</sup> For a development of this account, see Mayr and Spector (2010), as well as my discussion in chapter 2.

contrast, *some book* or *no book* do not contain the entire domain of books in every model. It follows that a global property of determiners, viz. their strength, is responsible for the contrast in (123c)-(123d).<sup>26</sup>

Therefore, two of the mismatches invoked by Glanzberg between first-order logic and natural logic can be explained by appeal to (what is standardly conceived as) global properties of natural language. Even assuming that the use of model theory (and the corresponding space of models) amounts to idealising from the absolute model (and the truth-conditions) for natural language expressions, there is no reason to believe that the idealisation does not capture essential linguistic properties. In fact, what we learn from the above examples, as well as from the binding economy study case discussed earlier, is that natural language is sensitive to global properties.

Zoltan Szabo brings into play new considerations against LNL. His argument from abstraction proceeds as follows.

When it comes to explanation by abstraction, the more abstract the better. The fact that (3) is an instance of (3') goes some distance towards explaining its validity, the fact that it is an instance of (3'') goes further, and the fact that it is an instance of (3''') is as good as it gets. This is as it should be – eliminating more and more clutter we get a clearer and clearer view of how the truth of the premises guarantees the truth of the conclusion.

- (3) Alex is a father; therefore Alex is a father or Alex is a mother
- (3') a is a father; therefore a is a father or is a mother.
- (3'') a is F; therefore a is F or a is M.
- (3''') p; therefore p or q.

Explanation by abstraction is just a step away from no explanation at all. It is roughly akin to saying “The validity of this inference is self-explanatory – you will see it for yourself as soon as I remove the irrelevant details that obscure your insight.” It is an attractive view that the limits of logic are set by the scope of adequate explanation by abstraction. Logical validity is epistemically fundamental – to explain it all we can do is remove the dust and hope that validity will shine through. Other validities are not self-evident – to explain them we have to appeal to necessary truths. (Szabó 2012)

<sup>26</sup> In fact, the full explanation of the contrast goes even further in making the tautologousness of *there is/are*-sentences with strong quantifiers as the source of the unacceptability of (123d)—see Barwise and Cooper (1981, p. 183) and Gajewski (2002, pp. 6-7) for details.

So, the challenge is to point to the features of (3) which make it a valid argument, an argument with such and such a logical form.<sup>27</sup> The logical form, (3'''), of (3) is obtained by abstraction. But does abstraction provide explanation? Szabo's argument thus amounts to asking the supporter of LNL to present grounds for the explanatory usefulness of the LNL thesis. So what is the explanatory force of logical form? My answer to the challenge is that the abstraction towards a logical form is explanatory, not merely in virtue of being a process abstraction, but in virtue of its end result: it succeeds in making sense of some otherwise puzzling facts about natural language. Recall that the 'binding economy' study case was prompted by questions regarding the behaviour of binding constructions. For instance, why does a proper name appear to be bound, despite its being in a condition C configuration? The answer was that the proper name appears to be bound only because it is coreferential with another noun phrase (in particular, a pronoun), and that coreference is allowed only if a particular logical relation holds between the coreference reading and the binding reading. Therefore, a particular logical relation explains why proper names appear to be bound, which would be otherwise puzzling from the viewpoint of traditional binding theory.

I conclude that no vicious or explanatorily trivial abstraction or idealisation is involved in getting to the logical properties of natural language expressions. What we do in defining or discovering logical properties is just setting aside facts irrelevant for the matter at hand. Leaving some facts aside does not falsify the ensuing account in the sense of adding properties (logical properties) that are not in the target system. An effective sceptical argument from abstraction or idealisation should show that the processes of abstraction or idealisation involve distortions that 'produce' logical properties that were not instantiated by the target system (in our case, by the grammar). No such positive reason was provided by the LNL sceptics. Given that abstraction and idealisation are common in other sciences, without a much clearer account of abstraction and idealisation in linguistics, and their purported shortcomings, the argument from abstraction/idealisation offers us no reason, beyond exclusivist assumptions, to doubt LNL.<sup>28</sup> Idealisation, as Chomsky (1995, p. 7) rightly pointed out, "is a misleading term for the only reasonable way to approach

27 The present argument is simpler, and more general than the previous ones. Firstly, Szabo does not argue against LNL from absolute semantics. Secondly, Szabo's argument is not premised on the acceptance of model-theoretic semantics. Thirdly, Szabo's argument does not target the claim that certain inferences in natural language have logical forms either. Rather, his argument targets the explanatory value of LNL. As such, the argument from abstraction advanced by Szabo is sceptical without making strong stipulations (e.g. exclusivism) about the boundaries of semantics.

28 In other words, there is equivocation on what precisely is the target of the abstraction/idealisation argument. It is not clear which is the 'true-part' and which the 'false-part' of these processes. Cf. Glanzberg (forthcoming[b], pp. 44, 48), Szabó (2012, 124ff.).

a grasp of reality.” This just suggests how difficult it is to make the argument from abstraction/idealisation palatable.

## 5.4 CONCLUDING REMARKS

Competent speakers can separate logically true sentences, e.g. *All students are students* from sentences that are not logically true. This is a big fact about our linguistic competence, and any framework that is equipped to characterise the logical properties of these sentences should do so. The fact that the logical sentences are not the immediate concern for the practicing linguistic theorists should not be interpreted as suggesting that logical properties are not empirically relevant. As far as I can see, it just suggests that logical properties of natural language are taken for granted, and that the theorists apply themselves to more difficult questions about natural language. Therefore, as long as model theory (or some other framework) provides us with the resources to define logical properties, suppressing these resources out of allegiance to some high-level desideratum (as the one behind exclusivism) amounts to signing up at the very outset for loss of empirical coverage.

An important dialectical problem for LNL scepticism is that it portrays the abstraction/idealisation process as aimed at getting a logic out of natural language. But this is not the proper aim of LNL: we want to know how much overlap there *is* between the class of logical consequences (and valid inferences) characterised by some logic and that realised by natural language, rather than show that the two classes coincide. Otherwise put, we want the ‘generative’ power of logic: the classes of models are theoretical tools that can define (‘generate’) properties that seem to be properties of language. It seems that an indefinite number of linguistic constructions have these logical properties. In this sense, logic is akin to other formal properties such as recursiveness and some form of compositionality since it generates structures that are empirically relevant. If this is true, the problem of getting a pure logic (or a pure logical form) of natural language misconstrues the aims of the logic in natural language thesis.<sup>29</sup> The LNL thesis is an essentially empirical hypothesis about language, and our task as theorists is to establish the limits of such a thesis, rather than to obtain a ‘pure’ logic out of it. In other words, to get support for LNL we don’t need to show that natural language distinguishes between, e.g., logical validity and lexical/linguistic validity, but rather that it distinguishes logical properties (viz. forms

<sup>29</sup> Nonetheless, this is the conception that LNL sceptics have in mind; see Glanzberg ([forthcoming\[b\]](#), 41ff.), Szabó (2012, 124ff.).

of validity and logical consequence) from non-logical properties (viz. forms of invalidity and contingency).<sup>30</sup>

In sum, LNL is a broad thesis and objections that do not target particular versions of this thesis are doomed to be inconclusive. For instance, on the face of it, notions of logicity are referred to in the syntactic linguistic literature, both in the proof-theoretical tradition (Chomsky 1957) and in the model-theoretic one (P. Blackburn and Meyer-Viol 1997, Potts 2002). The role of derivability and (preservation of) satisfiability are employed in such studies in order to define grammaticality. Moreover, logicity will be clearly found in natural language at a pragmatic level, if at all. These are all areas where LNL scepticism is not *prima facie* justified.

#### *Consistency claim*

Before concluding, we have to ask how would LNL look from the perspective of the controversy-based account. My claim is that the controversy-based account, the view for which I argued in chapter 2, preserves a crucial characteristic of the standard scope economy accounts, namely, its reliance on logical properties.

Recall that the implicature set consists of the scopal logical forms whose lexical items are completely ignored: that is, only functional items (e.g. quantifiers) are kept for the purposes of the computation. The scopal logical forms are obtained by some purely formal operation (e.g. quantifier raising) that acts on the functional items. Effectively, it swaps the quantifiers and reverses their precedence relation. Moreover, the functional items trigger (at least sometimes) scalar implicatures. Scalar implicatures are dependent on the semantic relations between these functional items. For instance, the implicature from *some* to *not all* is based on the semantic relation between the quantifying determiners *some* and *all*, which determines at the level of logical form an entailment relation (to the effect that sentences containing *all* entail sentences where we substitute *some* for *all*). Once more, there is nothing content-related (in the sense of absolute semantic sense) in the structural relations that determine scalar implicatures. The scopal logical forms and their implicatures form the implicatures

30 One worry the LNL sceptics might have is that the thesis over-generates: there are many natural language inferences that are not even grammatical, although their corresponding logical counterparts are well-formed. The problem of judging the adequacy of the thesis that natural language realises logical consequences may be conveniently compared with the problem of judging whether merge is an operation of syntactic structure building (cf. J. Collins 2011). One could say: merge surely overgenerates—e.g. the words *book* and *blue* cannot be freely combined, cf. *blue book*, \**book blue*—so in order to get merge out of natural language one have to abstract away from cases where merge does not give the right predictions. But this would be surely incorrect, since merge is not supposed to be the only structural constraint on language. Then this reasoning is also incorrect, *mutatis mutandis*, in the case of worries about overgeneration regarding the logical consequence relation in natural language semantics.

set, which is then used in order to determine the scopal admissibility of the logical forms. The property relevant for the computation of scopal admissibility is inconsistency. Needless to say, this is another formal property, since the precise real-world content corresponding to two logical forms is completely irrelevant for determining whether the logical forms are (in)consistent.

Therefore, it is clear that, irrespective of one's foundational view on logicity, the principles regulating scope on the controversy-based account *are* logical. One may opt for a syntactic or semantic view of logicity, but these views just spell out what is already made manifest by the way the mechanism posited operates, namely its formal inferential capacities. If this is so, no matter which linguistic economy account turns out to be true, we can keep holding on to LNL.

To conclude, in this chapter I have argued for three key ideas. (i) Logicity is referenced in explanatory hypotheses in linguistics, the Binding Economy principle being a case in point. (ii) The argument from absolute semantics is compatible with LNL; in particular, there are two broad ways of defining validity and logical consequence that cannot be ruled out by absolute semantics, a model-theoretic (or semantic) one and a proof-theoretic (or syntactic) one. (iii) Denying LNL on the grounds that it lacks formality or that it is obtained by abstraction and idealisation is problematic; both arguments fail to acknowledge that LNL shares with scientific inquiry more generally the need (and right) to delimit its subject matter (to fragments of natural language), make some postulations (e.g. about logical constants/functional items), and to abstract and idealise. These hypotheses (supporting logicity in natural language) should be judged on their overall plausibility and economy, rather than by comparing them to an ideal of logicity (requiring, for instance, that natural language should present us with pure logical forms, or that linguistic constructions have the same syntactic and distributional properties as their first order logic counterparts).

So the moral of the foregoing is that logicity (in the sense of logical properties such as realising a logical consequence relation) is both empirically and conceptually desirable as a property of grammar. A divide between content-properties (truth-conditions) and meta-logical properties, although it makes perfect sense when we think about formal languages, cannot serve as a divide in *empirical relevance*: it cannot be a divide between what is and is not empirically pertinent for natural language theorising. It is misleading to claim that stating truth- and satisfaction-conditions for linguistic expressions amounts to doing natural language semantics, while maintaining at same time that stating logical properties of linguistic expressions is just doing logic. Both 'content' properties and logical properties can equally well reflect features of the linguistic competence.

Within the overall argument of the thesis, this chapter serves to present another significant aspect of linguistic economy. In particular, it demonstrates that economy-based accounts lend support to a linguistic version of the LNL thesis, and thereby corroborates many other positive arguments to the effect that grammar is sensitive to logical properties. More generally, this chapter, taken together with the following, also purports to show that the linguistic economy principles have significant consequences on the architecture of the grammar, consequences that are unexpected and may sometimes run counter to one's philosophical intuitions.



## 6

ECONOMY-BASED ARGUMENTS  
FOR A NON-REFERENTIAL  
ACCOUNT OF COMPLEX  
DEMONSTRATIVES

*the*, the ‘definite article’, is  
*that* with a weakening of the  
demonstrative force.

---

Jespersen (1933, p.261)

The last two chapters of the thesis investigate the import of assuming that grammar is governed by economy principles. Linguistic economy, I argue, has significant consequences on debates in the philosophy of language and linguistics. In this chapter, I show that economy-based accounts argue for a special conception of noun phrases. I take as a study case complex demonstratives, but the implications of economy are broader, and likely apply to other noun phrases such as definite descriptions, pronouns, simple demonstratives, and proper names. The same methodological strategy as in the previous chapter applies: in order to study the consequences of economy, I need a baseline account, and I have chosen the standard principles of economy for this purpose. Once more, whilst my preferred statements of the economy-principles (namely, the ones for which I argued in chapters 3 and 5) would serve just as well, the standard principles are well-known and basically correct over the range of data important for the argument in this chapter. Therefore, since my favourite economy-principles account for the same phenomena in the semantics/pragmatics (rather than at the syntax/semantics interface, as the standard principles do), their prediction about the scope and binding patterns of complex demonstrative will arguably be the same. It is these predictions that will play the most significant role in this chapter, rather than the precise mechanism that accounts for them.

## 6.1 INTRODUCTION: AN OUTLINE OF THE ARGUMENT

In the recent linguistic and philosophical literature, the paths of little words such as *the* and *that* (also known as definite determiners), have been very different. This despite their similarity in many distribu-

tional respects, As a result, the more complex expressions in which these determiners can be embedded (e.g. *the man*, *that man*) have been seen as dissimilar too. So a mainstream view is that demonstrative and descriptive definites need to receive different treatments.<sup>1</sup> This chapter argues that such a division is not warranted with respect to definite descriptions and *complex* demonstratives (e.g. *the man in the corner*). I defend a non-referentialist position about complex demonstratives and, by extension, about definite descriptions. More precisely, I take referentialism to be *direct* referentialism. A directly referential expression is one whose content (rather than linguistic meaning or character) is invariant over possible worlds and is given directly, rather than *via* a descriptive condition. (This entails that directly referential expressions do not shift their denotations in the scope of propositional attitude verbs and other intensional operators.) My *non-referentialist* position is related to, but more neutral than, that of King (2001) and Elbourne (2008). I share with these authors a non-referentialist view, but I am less committed to a precise semantic treatment of complex demonstratives. Rather, I argue that an important class of cases suggests a general constraint on the syntax and semantics of complex demonstratives. I reach this position by a number of different and generally unexplored routes. In particular, in arguing that complex demonstratives are not referential, I shall mainly employ several well-supported principles of linguistic economy.

I put forward two anti-referentialist theses, which involve further assumptions about the syntax and semantics of complex demonstratives:

- i. Scope Economy implies that complex demonstratives and definite descriptions have identical scopal properties.
- ii. Binding Economy implies that complex demonstratives have the semantics of non-(directly)-referential expressions.

To support the two theses and use them to target the referentialist account of complex demonstratives, I need to make several assumptions about the principles of economy, which are needed to get my argument off the ground. Accordingly, I shall assume that the principles of economy are correct. Of course, like any empirical hypotheses, such principles may prove to be incorrect (or, as I argued in the previous chapters, not entirely correct). However, I contend that there are good reasons to adopt them. They can be taken as descriptive generalisations over a restricted (but relevant) set of data, and this is sufficient for the purpose of the present argument. A key step in

<sup>1</sup> Neale (1990), developing a Russellian line, treats definite descriptions as (restricted) quantifiers, while Kaplan (1989) argues that pure demonstratives (that is, a species of demonstratives) are directly referential. This further motivates a division between definite descriptions and demonstratives (including complex ones) more generally.

the argument will be to show that a smooth interface between syntax and semantics requires complex demonstratives (and other definites) to take non-referential semantic values. (If the arguments in the previous chapters are correct, the present argument can be restated in terms of principles governing the semantics/pragmatics interface. I return to this point in the conclusions.)

Focusing on linguistic economy has a significant impact on the strength of certain semantic *assumptions* that I am adopting, as well as on the shape of the *dialectic* of my argument. Crudely put, I shall be deflationary with respect to the former, and very flexible with respect to the latter. In particular, even if I shall make some provisional assumptions about the nature of definite descriptions and complex demonstratives, I'm ultimately neutral with respect to the precise semantics that these expressions have to receive. I am primarily interested in the specific implications of economy principles on the semantics of complex demonstratives and definite descriptions, and these implications will impose *constraints* on, rather than fully determine, the semantics of the definites. The constraint that will emerge is that these definites are non-referential. Moreover, the dialect will be flexible in the sense that I shall try to weaken referentialism about complex demonstratives from two distinct perspectives. One perspective, adopted in the first part of the paper, is to argue from quantificational (basically Russellian) assumptions about definite descriptions. The other perspective, adopted in the second part of the paper, is to argue from non-directly referential (basically Fregean) assumptions about definites. In other words, I argue for thesis (i.) by adopting Russellian (quantificational) assumptions about definite descriptions, trying to subvert the conviction that complex demonstratives lack the purported Russellian characteristics of definite descriptions. As for thesis (ii.), I defend its general plausibility by demonstrating the theoretical advantages ensuing from the assumption that complex demonstratives have a Fregean (non-directly referential) semantics. I leave open which precise non-referential analysis will ultimately account for the wide range of linguistic data considered here. I think that in order to argue for a precise semantics of definites one has to go far beyond economy considerations.<sup>2</sup>

## 6.2 SCOPE AND ECONOMY

In this section, I am concerned with the significance of scope for establishing the nature of complex demonstratives. I argue from a position of epistemic incertitude about the scope data, since they seem

<sup>2</sup> Paul Elbourne makes a good case for analysing definites, pronouns, and proper names as denoting individual concepts; see Elbourne (2005, 2008, 2013). See also Hawthorne and Manley (2012) for an equally promising alternative.

to me to be difficult. This will require fine-tuning the data in order to make them more clear cut, and sometimes taking two different perspectives on the same piece of data. My aim is to show that no matter what construction we consider (be it a construction involving a definite description or a construction involving a complex demonstrative), and no matter what perspective we adopt with respect to that construction, it is always possible to show that definite descriptions and complex demonstratives behave similarly when embedded in that type of construction. In other words, my argumentation strategy is always *comparative*: no matter where the data seem to lead us, they would lead us in the same direction for both complex demonstratives and definite descriptions. The significance of this purported similarity between complex demonstratives and definite descriptions will become apparent shortly.

### 6.2.1 The argument from scope

Arguments against quantificational theories of complex demonstratives are sometimes based on purported differences between their scopal interactions (with other operators) and the standard scopal interactions of quantificational phrases. The scope of a functional expression or operator (e.g. quantifier, negation etc.) is a theoretical notion that is meant to explicate why we have distinct judgements about the truth-conditions of a class of structurally ambiguous sentences. It is hypothesised that the structural ambiguity is a reflex of the scope-property of the functional expressions in question, or of the different relative positions (scopes) those functional expressions can take relative to each other. Here is an illustration of the scope possibilities of a linguistic construction, and their effect on the truth-conditional content of that linguistic construction. For instance, the sentence

3. All men are not cowards.  $(\forall > \neg), (\neg > \forall)$

may express the proposition that each man has the property of being non-coward (surface scope reading), or, alternatively, it may convey the proposition that not all men are cowards (inverse scope reading).<sup>3</sup>

<sup>3</sup> As far as the notational conventions are concerned, I represent the surface scope reading by  $(\forall > \neg)$  and the inverse scope reading by  $(\neg > \forall)$ , on the right hand side of the natural language sentence (as above). If one such reading is judged to be sounding odd, degraded, or completely unacceptable, I shall prefix it with ?, ??, and \* respectively. Throughout the chapter, I shall describe the scopal feature of a sentence in several equivalent ways. I shall say, for instance, that such a sentence has two readings or interpretations, or that it is structurally ambiguous, or that it manifests scopal flexibility. In case that sentence lacks these attributes, I shall say that it has one reading, is unambiguous, or is scopally rigid.

From a logical perspective, it is plausible to think that the scope-property of a natural language sentence is a syntactic feature that sometimes has, and some other times doesn't have, semantic—truth-conditional—consequences. This assumption seems natural in linguistics too, where the logical form (LF) is standardly taken to be a level that encodes the scope ambiguities. Example (3) clearly shows that the different interpretations of the scope-property have an effect on the truth conditions of the construction. In the case of (3), the two readings become available as a result of the fact that the universal operator ( $\forall$ ) can have two positions (or scopes) relative to the negation operator ( $\neg$ ).

But at some other times, the semantic effects of scope are not visible, as we shall see shortly.

The *argument from scope* is simply the following: since complex demonstratives have scopal properties that are different from the scopal properties of other standard quantifier phrases, the complex demonstratives cannot be quantifiers. In other words, the argument from scope is an inference from scopal differences to differences in syntactic/semantic category. This argument poses problems for quantificational accounts of complex demonstratives, and indirectly supports referentialist accounts. Non-referentialists are hard pressed to tackle the argument from scope. It is the purpose of the first part of this chapter to take the side of the non-referentialist, and thus argue *against* the pertinence of the argument from scope. But first it is worth making clear what the initial background motivation for the argument from scope was.

A familiar way of dividing up the varieties of noun phrases (or determiner phrases) is to distinguish between quantificational and non-quantificational phrases. Interestingly, the non-quantificational phrases are seen as (directly) referential. According to the so called *Dilemma Hypothesis* a term is either referential or quantificational (but not both). A referential term is syntactically simple. It refers directly to an entity, which is its (Kaplanian) content, and this content doesn't vary with possible worlds. In other words, the referential terms are object-dependent. In contrast, a quantificational term is syntactically complex, since it has the form [determiner + restrictor]. A quantificational phrase does not refer directly but *via* the descriptive material in its restrictor, and thus its content varies with possible worlds.<sup>4</sup> So, assuming this dichotomy, the argument from scope has it that if complex demonstratives are not (scopally) like definite descriptions, and definite descriptions are quantificational, it follows that complex demonstratives are not quantificational, and thus they should be directly referential. In the current chapter, I set up the theoretical options differently. I shall assume and defend a *version* of the Dilemma

<sup>4</sup> See Dever (2001) and Neale (1993) for the presentation and further motivation of the dichotomy. I follow here Dever's presentation.

Hypothesis. It is a version since I shall formulate it as a dilemma between (direct) referentialist accounts and non-referentialist (rather than quantificational) accounts. I give up on the original version of the dilemma since, as we shall see, the category of quantifiers, and the corresponding notion of scope, are not heuristically very useful (see the interim conclusion). It seems to me that the division between referential and non-referential (uses of) expressions is more promising, although not completely clear cut itself. In any case, even if two version of the dilemma were on equal footing, the second one serves our dialectical needs better, since it is consistent with the conclusions drawn in the second part of the chapter.

Much of the force of the argument from scope depends on the linguistic evidence that it invokes. In this section, I shall focus on the linguistic evidence for, and counter-evidence to, the argument from scope.

The argument from scope, as presented in Dever (2001, pp. 278ff.), purports to establish that we need to distinguish complex demonstratives (CDs) from quantificational phrases (QPs) on the basis of their scopal features.<sup>5</sup> This argument is presented in terms of the Russellian view of definite descriptions, and, for the sake of the argument, I shall assume this view in this part of the chapter. (However, our conclusions won't depend on this assumption.<sup>6</sup>) On the Russellian view, the definite descriptions are taken to be QPs, along the lines of standard quantifier phrases, e.g. 'every man', 'three women', 'some kids' etc.. One of the important features of QPs is that they typically engage in scope interactions. Dever claims (on behalf of the referentialist) that definite descriptions engage in scope interactions, whilst complex demonstratives don't. Thus, to exemplify, the famous sentence

4. The King of France is not bald.

- |   |                      |
|---|----------------------|
| a) $[\iota x : \text{King of France } x] \neg \text{bald } x$ | <i>surface scope</i> |
| b) $\neg [\iota x : \text{King of France } x] \text{bald } x$ | <i>inverse scope</i> |

is assumed to admit two readings, one in which the negation applies only to the predicate *bald* (surface scope), and the other in which the negation is moved so as to take scope over the whole clause (inverse scope). Some may find the inverse scope reading implausible,

<sup>5</sup> Dever presents the argument from scope and offers his own solutions to the perceived problems ensuing from this argument, problems pertaining to the peculiar scopal properties of complex demonstratives. In this chapter I shall suggest an alternative approach to these problems.

<sup>6</sup> The proponents of the arguments from scope follow Neale (1990) in making the assumption that definite descriptions are quantificational and therefore scopally flexible. Those who are neutral regarding the nature of definite descriptions, can take the evidence invoked by the argument from scope at face value, as pure linguistic evidence to the effect that definite descriptions behave truth-conditionally differently from complex demonstratives.

precisely because the negation presumed to take wide scope seems to be metalinguistic rather than sentential. (As I shall observe later on, this reading is in fact available for complex demonstratives as well.) The existence of the wide scope structure at LF for sentences such as the above has been already contested (see e.g. Glanzberg 2008). In this section, I will add a further argument from Parallelism and Scope Economy to show that complex demonstratives, definite descriptions and certain quantifiers pattern alike. They pattern alike, *inter alia*, by blocking wide scope for negation. Then a similar argument will be offered for the scopes of intensional operators relative to those of complex demonstratives, definite descriptions and standard quantifier phrases. My primary aim is to show that the scope-property of complex demonstratives is the same as that of definite descriptions, thereby undercutting the argument from scope.

The plan for the first part of the chapter is to argue against the argument from scope by considering the scope of negation in §6.2.3 and the scope of intensional operators in §6.2.4. I shall put together my sceptical conclusions about the referentialist uses of scope in §6.2.5. Then, in §6.3, I put forward a positive argument in favour of a non-referentialist condition on the semantics of complex demonstratives, based on binding-theoretic considerations.

## 6.2.2 Scope Economy and Parallelism

It might be thought that certain sentences are ambiguous as to their scope-properties (i.e., the scopes exhibited by the operators internal to these sentences) even if the different scopes do not determine different truth-conditions.<sup>7</sup> This is of course a coherent possibility. However, if the Scope Economy principle is correct, this possibility is not exploited by the grammar of natural language. Briefly put, thanks to economy in the grammar, there are no scopal interactions that yield truth-conditionally redundant outputs. In order to spell out this idea, consider the following constructions (adapted from Fox 2000, p. 30), and the scopal contrasts that they exhibit.

5. a) *A boy admires every teacher.* Mary does, too.  
( $\exists > \forall$ ),  $\ast(\forall > \exists)$
- b) *A boy admires every teacher.* A girl does, too.  
( $\exists > \forall$ ), ( $\forall > \exists$ )

The question raised by these linguistic data is why the first (italicised) sentence in the construction (5a) is scopally ambiguous, whilst

<sup>7</sup> For instance, Dever (2001, p. 279) suggests that “we are free to hold that [certain sentences] involve a quantified complex demonstrative [that] merely [give] rise to two readings which are truth-conditionally equivalent.” A similar position is suggested by Braun (2008b, 250ff.) for modal contexts. As we shall see, this is precisely what Scope Economy does not allow us to say.



the first (italicised) sentence in the construction (5b) is *not* scopally ambiguous. The only difference between the two resides in the sentences with which they are combined. I shall call these (second) sentences in each of the two examples *ellipsis sentences*, since they are obtained by eliding (deleting) part of their verbal phrase.

Let me first make clear what the relevant difference is. Embedded in (5a), *A boy admires every teacher* may be interpreted as saying that there is a *unique* boy who admires every teacher, or, alternatively, that there may be *multiple* boys that admire different teachers, and, taken together, admire every teacher. But, surprisingly, when we interpret this sentence in the context of (5a), where the sentence is followed by an additional (elided) sentence, namely *Mary does, too*, the ambiguity vanishes. That is, *a boy* in the first sentence refers to a unique boy who admires every teacher, and not to some boy or other. Hence, the first sentence no longer exhibits an ambiguity, as it does in isolation. In contrast, the first sentence in (5b) is not disambiguated when embedded. What is the cause of these contrasts in the scope patterns of basically the same linguistic constructions? Otherwise put, why does the very same sentence behave differently in the different embedding environments?

The strategy I shall be pursuing is essentially the one put forward by Fox (2000). Fox argues that scopal constructions that do not yield truth-conditional payoffs are disallowed at LF. The principle underlying this particular property of scopal constructions is called *Scope Economy* (SE). We can state the principle, informally, as follows. (In chapter 3, I reformulated the idea of scopal economy in terms of the Admissible Scope principle.)

**SCOPE ECONOMY** Truth-conditionally inert LF scopal structures are not grammatical.

The argument for (SE) makes use of an additional plausible principle, *Parallelism*, which, to a first approximation, requires that a truth-conditionally similar structure is realised in the antecedent and the elided sentence. Here is the argument. First, the ellipsis sentence (the second sentence in each example) is sanctioned by (SE). Second, by *Parallelism* (PAR), the second sentence imposes a parallel scopal configuration on the antecedent sentence (the first sentence in each pair). I shall call the mechanism formed from the two principles PARSE. Due to PARSE, we get the judgements represented in parentheses, whereby only the scopal configuration of the first sentence that corresponds to the scopally informative configuration of the second sentence is allowed.

PARSE is presumed to be responsible for the puzzle exhibited by the sentences in (5). The key piece of data is that the ellipsis sentence in (5a), viz. *Mary does [admire every teacher], too*, is scopally rigid (or unambiguous), since, intuitively, there is only one way to go about

interpreting it. Scope Economy prevents syntactic or formal operations from applying if these operations do not produce a different interpretation. Since no syntactic operations apply, there will be no inverse scope for the ellipsis sentence in (5a), and the unique syntactic configuration of the ellipsis sentence will be propagated in the first sentence of (5a) *via* Parallelism. Hence, *A boy admires every teacher* will have only one interpretation in the context provided for it in (5a), although, taken in isolation, it has two readings. This explains why the reading  $*(\forall > \exists)$  is not permissible for the first sentence. In contrast, no rigid scopes occur in (5b). The ellipsis sentence *A girl does [admire every teacher], too* is ambiguous, and, by Scope Economy, receives two syntactic scopal structures. Analogous structures will be imposed *via* Parallelism on the first sentence, *A boy admires every teacher*, which will be ambiguous as well. We thus obtain the reading two readings for the first sentence, including the reading that was missing in the previous case ( $\forall > \exists$ ).

Note that Scope Economy has a limited application: it does not sanction scopal interactions between any operators whatsoever. There are logically-possible scopal interactions which are not available to natural language. Whilst it is true that *some* truth-conditional content does matter for the purposes of licensing logical forms (and thus the scope possibilities of the operators), we can find cases in which other truth-conditional effects that are ‘in principle’ possible do not seem to matter in the least at the interface between syntax and semantics.<sup>8</sup> As we shall see, this insensitivity of Scope Economy to certain truth-conditional contents will not interfere with our argument.

Assuming that the claims regarding PARSE are on the right track, I shall argue that complex demonstratives and definite descriptions pattern in the same way *because* our two principles cannot discriminate between the scope possibilities afforded by constructions containing complex demonstratives and definite descriptions. Additionally, I shall highlight the scopal similarities of complex demonstratives and definite descriptions, and other scope-taking operators. It will also become apparent that my argument regarding the scope of intensional

8 Presumably, further syntactic constraints (such as island constraints and clause-boundedness of quantifier raising) block such possibilities. One example is that sentential negation of the form *it is not the case that* or *it is not true that* does not scopally interact with quantifier phrases. Another example is that definite descriptions do not interact with negation. Thus, even if in principle the scopal interaction is possible (indeed Russell and his followers thought that not only it is possible, but that negation does interact scopally with definite descriptions), such a possibility does not seem to be realised by the grammar. As we shall see, Scope Economy is part of the reason that such an interaction is not grammatically licensed. But the cause for the lack of interaction may run deeper than Scope Economy. One possible explanation—an explanation that we do not endorse—may be that definite descriptions are simply not quantifiers, so they cannot move to take scope. In such a case, Scope Economy will merely register the effect of this (merely hypothetical) syntactic constraint on movement. Another cause may be general constraints on movement. (This seems to be the case for the lack of scope flexibility of *it is not the case that*.)

operators (in section §6.2.4) actually holds independently of the two principles, and thus that the two principles further corroborate my conclusion.

In what follows, I apply the PARSE method to cases involving negation (*not*) and intensional operators (*possibility*, *belief* etc.). This method detects scope. The method is essentially the one underlying our previous examples (see e.g. (5)). We take one sentence whose scopal ambiguity we want to test (target sentence) and combine it with an additional sentence which is unproblematically ambiguous (test sentence). Then we study the effect of the target sentence on the (ambiguous) test sentence. The ambiguous test sentence reflects the properties of the target sentence. There are two possible outcomes. (i) If the effect on the test sentence is that the test sentence is restricted to a single scope configuration, this means that the target sentence is not ambiguous, and admits only one scope configuration; in particular it will exhibit the corresponding scopal structure.<sup>9</sup> (ii) But if the effect on the test sentence is that the test sentence continues to exhibit ambiguity, then the target sentence is ambiguous as well.

I shall sometimes refer to the two, antecedent and ellipsis, sentences as a *composite*. The composite will thus always take the form *antecedent sentence* + *ellipsis sentence*. This will be the form that most of our subsequent examples will take. A composite has a symmetrical structure in each of its two parts. It is in virtue of this fact that we shall be able to test scopal properties.<sup>10</sup>

9 But what exactly does the notion of *corresponding* structure amount to? Let me first illustrate. The scopal configuration of the test sentence (here, the first sentence) in *Every teacher admires a pupil. Mary does too* is, by PARSE, the configuration where the existential (*a pupil*) takes scope over the universal (*every teacher*). This corresponds to the scopal reading of the second (target) sentence (*Mary does too*). The unique scopal reading of this (target) sentence entails that there is a unique pupil, and the first sentence's only scopal configuration that produces the same entailment is the one where the existential takes scope over the universal. (Only in this scopal configuration does the first sentence entail that there is a unique pupil.) Thus, a fixed scopal structure A of a sentence s corresponds to a fixed scopal structure B of a sentence t if A preserves the same entailment that B does. If one of the two sentences, say t, is unambiguous, and thus, by Scope Economy, has only one fixed scopal structure, then, by Parallelism, the composite s + t will disambiguate s to whatever scopal structure preserves the same entailment as t. As illustrated above, the scopal structure of s—as disambiguated through the PARSE mechanism—may not correspond to the surface scope of t. This means, in general, that the patterns of entailment rather than the syntactic scopal structure constrain the reading of the target sentence under Parallelism.

10 One may ask why is it necessary to use ellipsis at all. Ellipsis is a safety condition that ensures that Parallelism works properly, i.e. that it projects 'parallel' or structurally similar scopal configurations (see the remarks about the notion of correspondent scopal structure and Fox 2000, pp. 29ff. for discussion). Parallelism seems to be a more general linguistic principle, and may share important features of visual cognition (see Kuno 1987, pp. 7ff.).

## 6.2.3 The relative scope of negation

A relevant test involves composites consisting of sentences that are uncontroversially structurally ambiguous. If these ambiguous sentences cannot disambiguate the sentences containing definite descriptions and complex demonstratives, we get further evidence that the latter are not in fact scopally ambiguous. Accordingly, one good way to test scope is to consider two composites with antecedent sentences consisting of descriptions and demonstratives respectively, as illustrated in (6).<sup>11</sup>

6. a) *The* King of France is not bald. And a duke of England is not either. (the > ¬), \*(¬ > the)  
 b) *That* King of France is not bald. And a duke of England is not either. (that > ¬), \*(¬ > that)

The result is that inverse scope readings are blocked in both cases. So descriptions and demonstratives are similar in their impact on the clearly ambiguous sentence that occupies the second position in the composite.<sup>12</sup> Hence, since not even the otherwise ambiguous sentences (containing quantifiers and negation) can trigger inverse scope readings of complex demonstratives and definite descriptions, we are entitled to claim, by PARSE, that complex demonstratives as well as definite descriptions cause scope rigidity, and therefore are scopally rigid. One might object that the PARSE configurations are not the right environment for scope to show up. Although I agree with the spirit of this observation, and we surely need to consider other types of environments to test the scope of demonstratives, note that, as far as the PARSE test is concerned, complex demonstratives and definite descriptions fall into one class, whilst standard quantifiers fall into another. PARSE does not show any contrast between the two types of definites (complex demonstratives and definite description), but it does show one between quantifiers and definites.

There is a further class of non-intensional examples that straightforwardly points to the same similarity in scopal flexibility between complex demonstratives, definite descriptions, and proper names. That is, take a standard ambiguous test sentence (e.g. *A student likes every professor*) and combine it with target sentences containing complex demonstratives (e.g. *That teaching assistant likes every professor*), eliding appropriately one of the sentences. It is a simple exercise to show

<sup>11</sup> Since Parallelism is symmetrical, swapping the sentences in the composite (and eliding one of them appropriately) will create the same effect. That is, there will be no inverse scope reading in this case. Both sentences in the composites take a uniform, narrow-scope negation.

<sup>12</sup> We could consider a third composite containing proper names in each of the cases in order to emphasise the similarity in scope possibilities between descriptions, demonstratives and proper names (e.g. *Three men in black are not bald. And John is not either*). It's easy to see that proper names have the same scopal possibilities as descriptions and demonstratives. We return to the significance of this remark later on.

that complex demonstratives pattern with definite descriptions (and proper names, as shown in fn. 12). So, the non-negative contexts (contexts without negation) prove the same point.

To sum up, it is plausible to think that the source of scopal rigidity has to do with definite descriptions and complex demonstratives. It can be easily seen that existential quantifiers do not freeze the scope associated with the ambiguous test sentences as CDs and DDs do.

A common referentialist retort to the observation that some tokens of complex demonstratives and definite descriptions behave similarly is that complex demonstratives, sometimes, go proxy for definite descriptions, or, alternatively, are charitably interpreted as definite descriptions on the circumstances of utterance. Thus, the referentialist has reason to treat such cases as special cases, and set them aside. This claim looks dubious because it presupposes the existence of a mechanism that re-interprets one semantic structure as an entirely different one. In contrast, on our account, this identification of complex demonstratives and definite descriptions will not seem *ad hoc* since I shall claim that complex demonstratives *are* like definite descriptions in important syntactic and semantic respects.<sup>13</sup> This, along with the non-ambiguity account of complex demonstratives that I shall endorse later on, gives a more general and less *ad hoc* account of the syntax and semantics of complex demonstratives than the referentialist one.

#### 6.2.4 The relative scope of intensional operators

In this section, I examine the scopal interactions between intensional operators and complex demonstratives.

Dever (2001) points out that there are cases in which scopal interactions cannot be distinguished and that their indistinguishability is due to their truth-conditional equivalence under each of the two scope readings. (Cases in point are those where a definite description or complex demonstrative combines with a universal quantifier.) However, the distinction between surface and inverse scopes becomes visible when we use intensional operators. If there are no ambiguities, then, the argument goes, complex demonstratives are not quantifiers. And indeed, Dever does not find scope ambiguities in any of the following intensional sentences, borrowed from Dever (*ibid.*, p. 271).

7. That man in the corner could have stayed home tonight.

<sup>13</sup> This is not to claim that complex demonstratives are exactly like definite description. Admittedly, the demonstratives have a clear demonstrative character, which definite descriptions lack. For instance, one can use *that* by pointing to an object in uttering *that is big*, but the same cannot be said about the definite *the* in *\*the is big*. However, note that a similar difference can be replicated with expressions that are often taken as quantifying determiners, for instance *all* and *a*: *all are big* vs. *\*a is big*. Thus, some differences in distribution should not detract us from saying that two expressions have basically the same syntactic features.

8. That governor of California used to be a Democrat.
9. Albert believes that that upright citizen is a spy.

Dever's assessment of the above sentences seems plausible: scope ambiguities are doubtful here if we interpret the sentences out of the blue. However, in light of the coming discussion, I claim that there is another plausible explanation of the scopal pattern exhibited by the examples above. Moreover, if we correctly control the linguistic constructions and their contexts of utterance, the apparent scopal differences between the two types of definites simply vanish. It is worth reminding the reader that the argument is *comparative*, and purports to show that whatever reading one might get with complex demonstratives, that reading is claimed to be available for definite descriptions as well (and *vice versa*). So the force of the argument resides in showing that the judgements, even if sometimes hazy, are the same for sentences with demonstratives and descriptions. In this way, we can compensate for the uncertainty associated with each example taken individually.

Kripke (1980) and others have argued that there is a contrast between definite descriptions and proper names in that proper names designate rigidly, whilst definite descriptions are (most of the time) non-rigid designators. In possible world semantics this amounts to saying that only definite descriptions, but not also proper names, are capable of having various, possible world dependent contents (viz. referents that vary with the possible world of evaluation). However, this doesn't mean that definite descriptions always have semantic values that are sensitive to possible worlds. This fact points to a similarity between definite descriptions and complex demonstratives. Substituting definite descriptions for the complex demonstratives determines equally non-ambiguous constructions:

10. The man in the corner could have stayed home tonight.
11. The governor of California used to be a Democrat.
12. Albert believes that the upright citizen wearing a tie is a spy.

(Note that I assume with the proponents of the argument from scope—and for the sake of this argument—that the different modal profiles of the operators in question are in part due to their scopal properties.) Consider the first sentence with the definite description *the man in the corner* taking surface scope over the modal operator. As with the corresponding case involving complex demonstratives, I find it equally difficult to get an inverse scope reading. Under such a reading, the man in the corner should vary with the possible worlds that we are considering, and thus should find himself, roughly speaking, in a situation in which he is both in the corner and at home at



the same time (see below for discussion). However, the unavailability of the wide scope modal in this case may be due to our privileging a referential reading of definite descriptions.<sup>14</sup> Suppose that the wide scope modal reading were available, but non-salient, after all. Even if this were so, and one did get the wide scope reading of the modal *could*, I see no reason why it shouldn't be available for complex demonstratives as well. Consider the sentence above, repeated here for convenience

13. That man in the corner could have stayed home tonight.

a) [that  $x$  : man in the corner  $x$ ]  $\Diamond$  (stayed home tonight  $x$ )

b) ?? $\Diamond$ [that  $x$  : man in the corner  $x$ ] (stayed home tonight  $x$ )

The second interpretation reads as follows: for every possible world  $w$ , whoever is the unique distal person satisfying the description inside the complex demonstrative (i.e. satisfying *man in the corner*) is also a person who stayed at home at a particular time  $t$  (i.e. at night time) at  $w$ . In a context in which the sentence is uttered about a man who is, say, in the corner of a pub, and further assuming that the pub is not his home, the inverse scope interpretation will be false at all possible worlds  $w$  and so necessarily false. (For now, nothing hinges on the 'necessarily false' judgement, since we can characterise it simply as very implausible or unlikely.) This is because, in that particular context, two contradictory predicates—*being in the corner of the pub at  $t$*  and *being home at  $t$* —are predicated of each possible individual satisfying the complex demonstrative. Thus, the inverse scope reading is roughly this: It might have been the case that whoever sits in the corner of the pub is at the same time at home. Once again,

- 14 Rothschild (2007a) proposes a distinction between role-type and particularised uses of definite descriptions, whereby only the former pragmatically presupposes the existence of a unique satisfier at the world of evaluation. In other words, only the role-type definite descriptions should be used when it is common ground that there is a unique individual that can satisfy the description. The particularised definite descriptions need accommodation in order to get an interpretation on which there is a unique satisfier at the world of evaluation. A typical example of a role-type definite description is *the president of U.S.*; a typical example of a particularised definite description is *the man in the corner*. Rothschild argues that only role-type uses of descriptions can produce (a reading equivalent to) the narrow scope reading under modal operators, basically because they already guarantee the existence of a unique relevant individual at each possible world (rather than no such individual, or more than one). In contrast, particularised uses of definite descriptions do not guarantee that such the unique relevant individual exists at each world, and thus they will be typically interpreted as taking scope outside the modal (unless some contextual information can be produced in order to revert this default interpretation). We study here mainly particularised uses of definite descriptions. The extent to which particularised definite descriptions can receive narrow scope readings depends on the particular context in which they are evaluated. How easy (or difficult) it is to get the narrow scope readings under modals will hinge on our capacity of imagining such contexts when particularised definite descriptions are evaluated out of the blue.



this reading does not seem to be available, and neither does the corresponding reading for the sentence containing a definite description instead of a complex demonstrative.<sup>15</sup> But if you do find the necessarily false reading available, this will be counter-evidence to my argument (viz. the argument against the argument from scope) only if definite descriptions do not allow for this reading.

A similar remark can be made about (12): *Albert believes that the upright citizen wearing a tie is a spy*. Many will find, contrary to the assumptions of the argument from scope, that this construction ambiguous between the two scopal readings, since the narrow scope reading of the description is very difficult to get (see fn. 14 for a potential explanation). I find that this construction does allow for the narrow scope reading for the definite description, but I also find the corresponding narrow scopal reading for the complex demonstrative possible. A context that makes these readings more salient is one in which it is assumed that in the relevant possible worlds there always exists a unique individual who wears a tie. Then, the narrow scope reading for the two definites goes easily through. In the absence of such a context, both definites tend to receive a wide scope reading, outside the intensional operators.

We can examine the scopal possibilities more systematically by making use of the method based on our two principles, Scope Economy and Parallelism. To examine the scopal interactions with modals, consider the following sentences (inspired by Dever's examples) in the usual composite configuration, *first sentence* + *ellipsis sentence*. As we have seen, Scope Economy and Parallelism can detect all the scopal possibilities of ambiguous composites in non-intensional contexts. Do they do the same in intensional ones? To answer this question, we consider composites consisting of standard quantifiers paired with a modal. The minimal context of utterance for the following constructions is one in which we are talking about men in some pub and we ask whether it's possible for them to be at home.

14. a) Every man in the corner could have stayed home. And all men in the middle could have too. ( $\forall > \Diamond$ ), ??( $\Diamond > \forall$ )  
 b) Every man in the corner could have stayed home. And all the men in black could have too. ( $\forall > \Diamond$ ), ??( $\Diamond > \forall$ )

It is very hard to hear the narrow scope interpretations for the modals. The narrow scope interpretation for the modal in (14a) would involve a contradiction (under plausible pragmatic assumptions), but it's very difficult to hear such a contradiction. The same is true for definite descriptions and complex demonstratives (as well as for proper

<sup>15</sup> For instance, Hawthorne and Manley (2012, p. 211) find that the similar construction *That guy who is actually president might not have existed* does not exhibit an obviously false narrow scope reading for the demonstrative. This seems to be the case with our (13b).

names, omitted here.) In effect, the definite descriptions and complex demonstratives in the ellipsis sentences in (15a) and (15b) respectively, cannot take narrow scope, and, consequently, cannot trigger wide scope readings for the modals.

15. a) Every man in the corner could have stayed home. And the man in the middle could have too. (the  $> \diamond$ ), ??( $\diamond >$  that)  
 b) Every man in the corner could have stayed home. And that man in black could have too. (that  $> \diamond$ ), ??( $\diamond >$  that)

There are two important points to note about these cases. (i) Both the antecedent and the elided constructions resist the wide scope reading of the modal ‘could,’ and thus we get the ??( $\diamond > \dots$ ) judgements. In order to work out what the wide scope reading might have been, consider the ‘in principle’ possible contrast between (14a) and (14b) cases, where the descriptive contents of the quantifiers ‘some’ and ‘every’ are *men in the middle* and *man in black* respectively. The contrast is that the former could in principle involve a contradiction, whilst the latter could not. The former would say that some men in the middle of the pub are home at the same time, whilst the latter would say that every man is both a man who wears black and stays at home, which is surely non-contradictory under the minimal contextual information assumed here. But in fact this ‘in principle’ contrast is not exhibited by the interpretation of the above sentences. This comes to saying that the readings in which the modals have wide scope are impossible in all the sentences above. Consequently, (ii) our test using the two principles, Scope Economy and Parallelism, fails to show any interesting outcome. (As in the case of Fox’s data, we need a scopally ambiguous antecedent sentence in order to test the effect of Scope Economy on the ellipsis sentence by Parallelism.)

A plausible reason why Dever’s modal example does not manifest scope flexibility is that the modal is in the perfect form which introduces something akin to a presupposition of counter-factuality. E.g. *you could have done it* implies that you didn’t do it. Similarly, in saying that the man *could have stayed home*, one suggests that the man did not actually stay home, and this, in turn, has an effect similar to pulling the quantifiers, the definite descriptions, or the complex demonstratives out of their place in the scope of the modal. The presupposition of counter-factuality interferes with our judgements of scope. We can remove the effect of the alleged presupposition by rephrasing our examples using simpler modal forms (*can*, *could*) or other intensional operators (as the ones suggested by Dever and cited above in (8)-(9)). I shall call such modals *soft intensional operators*.

The following constructions are similar to the ones above, except for their using soft intensional operators.<sup>16</sup>

<sup>16</sup> I use  $\diamond$  to represent all the intensional operators indiscriminately.

16. a) *The* man in the corner can/could/might stay home.  
(the >  $\diamond$ ), ?( $\diamond$  > the)  
 b) *That* man in the corner could stay home.  
(that >  $\diamond$ ), ?( $\diamond$  > that)  
 c) *Every* man in the corner might stay home.  
( $\forall$  >  $\diamond$ ), ?( $\diamond$  >  $\forall$ )

These constructions seem to me to make available both scopal readings. We could interpret them as saying something either about the modal profiles of actual men in the corner, or about the men that happen to satisfy the condition in various possible situations. The second interpretation is still marginal, but I find it possible nevertheless. (Some may doubt that it is available.) However, there is yet another way to modify these examples in order to make wide scope modals salient. Indeed, when using the suitable predicate, the wide scope reading of the modal becomes manifest.

17. a) I thought that *that* man in the corner was not in the corner.  
(the >  $\diamond$ ), ( $\diamond$  > the)  
 b) I thought that *every* man in the corner was not in the corner.  
( $\forall$  >  $\diamond$ ), ( $\diamond$  >  $\forall$ )  
 c) *That* man in the corner could not be in the corner.  
(that >  $\diamond$ ), ( $\diamond$  > that)  
 d) It is possible that *some* men in the corner are not in the corner.  
( $\exists$  >  $\diamond$ ), ( $\diamond$  >  $\exists$ )

It is fairly easy to hear a contradiction when reading the above sentences. For instance, upon hearing (17c), one may disapprovingly reply “No, that man in the corner cannot fail to be in the corner, because he just is a man in the corner.” That is, the complex demonstratives (as well as the descriptions and the standard quantifiers) can take narrow scope under a modal. Under the interpretation exploited by the above disapproving answer, all the above sentences imply that there are possible worlds in which a man satisfies contradictory predicates. Of course, this is not to say that this reading is salient in the sense that it is the interpretation on which the parties in a conversation will zero in. The other possible reading is much more salient, presumably because it is favoured by something like Grice’s Maxim of Quality, viz. don’t say what you believe to be false; see Grice (1967/1989). The key idea is that if this reading is indeed available, we find, once again, that definite descriptions and complex demonstratives behave in the same way with respect to their scopal possibilities.

Taking inspiration from the yacht example of Russell (1905), we find further constructions that have the same contradictory flavour specific to the wide scope modals above. We expect that they too

will show that complex demonstratives and definite descriptions (and other quantification phrases) behave on a par.

18. a) I believed that *the* man in the corner was taller than he  
(actually) was. (the >  $\diamond$ ), ( $\diamond$  > the)
- b) I believed that *that* man in the corner was taller than he  
(actually) was. (that >  $\diamond$ ), ( $\diamond$  > that)
- c) I thought that *every* man in the corner was taller than he  
(actually) was. ( $\forall$  >  $\diamond$ ), ( $\diamond$  >  $\forall$ )

These examples will receive different analyses according to the theory of comparatives one endorses.<sup>17</sup> Under our basically Russellian analysis of the comparative constructions, the structural ambiguity is a matter of scope. (This assumption is not uncontentious, but what matters in the end for our argument is the structural ambiguity, and the way it can discriminate between definite descriptions and demonstratives.) The two readings are brought out as follows. The ‘taller than’ relation expressed by the verb phrase in the subordinate clause yields the two alternative results—the contradiction and the more natural reading—because we can vary independently the degree of tallness of the two arguments of the relation. And the independent variation with possible worlds is obtained by the choice of scope of the intentional operator, namely by choosing narrow scope intensional operators. When intentional operators have narrow scope under the other operators (e.g. *the*, *that*, *every*), the degrees of tallness of the arguments of the *tall*-relation may differ, and saying that the referent of one argument is taller than the referent of the other argument makes sense. In contrast, when the intensional operator takes wide scope, the degrees of tallness will not vary independently and, in fact, they will be the same in every possible world. In such a case, it is contradictory to say that a degree of tallness is (strictly) greater than an equal degree of tallness. As the contradiction becomes apparent, we access the narrow scope reading of the modal. Therefore, it is plausible that the complex demonstratives are not scopally rigid as some authors have suggested.

One may not be convinced by examples involving contradictions precisely because they exploit a (perverse?) tendency to look for contradictions. It may be claimed that such tendencies create only illusions of scope. (I made much of this sort of tendency in the third

<sup>17</sup> Some theorists have presented strong evidence against a Russellian analysis of comparative constructions in terms of scope. Heim (2000, p. 51)—drawing on von Stechow (1984)—points out that the sensible (non-contradictory) reading of comparatives in yacht-type sentences cannot be a matter of scope, since this reading will need to cross island boundaries when the comparative construction is embedded in the antecedent of a conditional, and, even worse, it will misrepresent the truth-conditions of such conditional statements. Thus, von Stechow (*ibid.*, 12ff.) argues that Russellian accounts make wrong predictions about a conditional statement such as *If Mary smoked less (than she did), she would be healthier (than she is)*.

chapter's 'controversy-based' account of scope, and I argued that it offers an interesting and plausible perspective on the scopal properties of a number of linguistic constructions.) In any event, there are further examples which do not exploit potential contradictions. Aided by the background information, we can construct further examples manifesting similar scopal flexibility across a wide domain of expressions. The context for the utterances below is as follows. A waitress tells her colleague about the men at the "cheaters' table," i.e., that table in a restaurant which is conveniently hidden or isolated from outside views so as to allow cheaters secretly to meet their lovers. The waitress thus tells her friend the following.<sup>18</sup>

19. a) *The* men at the cheaters' table could be despicable.  
(the >  $\diamond$ ), ( $\diamond$  > the)
- b) *Those* men at the cheaters' table could be despicable.  
(those >  $\diamond$ ), ( $\diamond$  > those)
- c) *All* men at the cheaters' table could be despicable.  
( $\forall$  >  $\diamond$ ), ( $\diamond$  >  $\forall$ )
- d) *A* man at the cheaters' table can hide under the table.  
( $\exists_1$  >  $\diamond$ ), ( $\diamond$  >  $\exists_1$ )
- e) *That* man at the cheaters' table can hide under the table.  
(that >  $\diamond$ ), ( $\diamond$  > that)

I find that these examples allow for both scopal readings. The waitress may mean that some particular (actual world) men/man at the cheaters' table could be despicable. But she may equally mean that men at the cheaters' table, quite generally, can be despicable. Otherwise put, she may equally mean that men that sit at the cheaters' table at some possible world, different from the actual one, are despicable. (There is a contrast between the availability of narrow scope demonstratives, as the plural ones seem to take narrow scope more easily. This does not affect our argument, as long as the contrast holds for definite descriptions as well, which seems to me to be the case.)

Since we have a stock of sentences which are ambiguous, we expect that the mechanism created by the interaction of Scope Economy and Parallelism should classify them as ambiguous as well (in the parallel, symmetrical fashion specific to this mechanism). Arguably, this is precisely what happens. I leave this as an exercise for the reader. If my discussion so far is correct, the PARSE method will just confirm the above judgements of ambiguity.

It is important to consider how the present argument fares with other takes on the scope of complex demonstratives in the literature.

<sup>18</sup> Alternatively, we can prefix "possibly" to the above sentences and drop "could". It may help to take the modals to be epistemic. In this interpretation, the waitress says that as far as she knows, it is possible that those men at the cheater's table are despicable. The same readings may be obtained with other intensional operators, such as "I thought."

Jeffrey King (a quantificational non-referentialist) and David Braun (a referentialist) have a series of exchanges<sup>19</sup> that touch on the scope of complex demonstratives relative to intensional operators. The bone of contention is the availability of narrow scope readings of complex demonstratives. Complex demonstratives should exhibit such readings on a quantificational view. Braun points out that the examples provided by King are all controversial. But none of the constructions previously analysed here is mentioned in that context. I think that the previous examples—especially (18) and (19)—can serve to answer the referentialist challenge; they show that narrow scope complex demonstratives are indeed available. This is precisely what we would expect if complex demonstratives were quantificational, or, more generally, non-referential.

Braun (2008b, 247ff.) also mentions certain negative contexts that seem to pose problems for a quantificational account, namely sentences like *That man in black does not exist*. The objection is essentially a restatement of the argument from scope: the same sentence with a definite article substituted for the demonstrative—e.g. *The man in black identical with b does not exist*<sup>20</sup>—exhibits scope ambiguity, but, the argument goes, the demonstrative one is unambiguous. Braun assumes as unproblematic that definite descriptions give rise to scopal ambiguities. As indicated, I do not have the same judgements about the interactions between definite descriptions and negation. More importantly, I have just argued from scope economy considerations that in fact such demonstratives and descriptions are identical in their scope-taking behaviour.

Braun acknowledges that his arguments rely heavily on pragmatics. This is significant, since it is then easy to show that the arguments from scope do not offer any advantage to the referentialist. I contend that, sticking with the examples of the type suggested by Braun, both complex demonstratives and definite descriptions will again come out as scopally alike. Suppose John says, in speaking about Homer, “That man wrote the Iliad and the Odyssey” and Mary retorts “That man does NOT exist” or, a bit more naturally, she utters “That man did NOT write the Iliad and the Odyssey.” I can easily hear the wide scope reading—or a truth-conditionally similar metalinguistic reading—of the negation. Mary does not mean to deny that some author or other wrote the Iliad and the Odyssey, but only that there is a unique (and in some sense) distal person who authored

<sup>19</sup> See especially King (2008), Braun (2008b) and references therein.

<sup>20</sup> The reason why the definite description *the man in black identical with b* includes the ‘identical with b’ condition is that, on a non-referential view, this sort of condition is what separates a referential use of a definite from a non-referential use. Then, the version of the argument from scope discussed here attempts to show that the type of definite description that non-referentialists claim is equivalent to a referential use of a complex demonstrative has, in fact, different scopal properties than the complex demonstrative itself.



the works usually attributed to Homer. Plausibly, these are cases of metalinguistic negation (see Horn 2001). Of course, metalinguistic negation may not have anything to do with scope. However, recall that this particular argument is given under the assumption that the pragmatic aspect *does* show something about the scope-properties of linguistic constructions. My point is that assuming that scope is in part a pragmatic phenomenon gives us stronger reasons to put definite descriptions and complex demonstratives into the same category. If so, this doesn't help the referentialist in isolating complex demonstratives from definite descriptions. The pragmatic mechanism affecting the scope of definite descriptions is bound to affect the scope of complex demonstratives as well.

The main moral of this section is that the interpretations of complex demonstratives and definite descriptions show a common pattern. The economy-based data are generally indicative of the common pattern. I also made an independent case that complex demonstratives and definite descriptions have the same behaviour in intensional contexts. The PARSE mechanism is not crucial in this case, and, in effect, was not posited to account for the putative scope of modals, which may be affected by other principles than those that affect DPs.<sup>21</sup> Nevertheless, PARSE further corroborates our point about the scopal similarities between definite descriptions and complex demonstratives.

### 6.2.5 Interim conclusions about scope

Some theorists may object to the assumption that the data invoked previously are a matter of scope. It is true that I talked in terms of scope, but what really matters for my purpose are the predictions in terms of judgements about truth-conditions. Firstly, in making remarks about the scopal similarities between proper names, definite descriptions and complex demonstratives (see e.g. fn. 12), I do not mean to say that the rigidity of proper names is a matter of their scope taking property.<sup>22</sup>

Secondly, some of the patterns of the data I presented, and especially those involving negation, may pertain to their focal possibilities, rather than to their scopal possibilities. If this is the case, the economy principle will be sensitive to the truth-conditions associated with the focal possibilities or alternatives of a given linguistic construction. (See fn. 23.) Thirdly, when it comes to the interaction between defi-

<sup>21</sup> The original domain of the economy-principle—in Fox (2000)—is the scopal interaction between DPs. See Mayr and Spector (2010) for a more general application of a similar principle of scope economy to modals, and chapter 1 for discussion.

<sup>22</sup> It may well be the case that the account of rigidity in terms of scope is correct, but I neither make or need, this stronger assumption here. My observations are compatible with a semantic mechanism that manipulates the world of evaluation of the relevant expressions, in the sense that it lets the denotation of that expression to vary across possible worlds or just fixes the denotation at the actual world.



nites and intensional operators, we can in principle get distinctions in truth-conditions *via* scope or, alternatively, *via* directly manipulating the possible world denotation of the expressions in question. This is *prima facie* compatible with the PARSE mechanism. We are free to stipulate that PARSE detects truth-conditional distinctions that are not due to scope but to some other device. Finally, it is important to note that I basically followed the referentialists' train of thought, and drew consequences from their assumptions. Even if it turns out that what I took to be scope is not a coherent and unitary phenomenon after all, this will equally undermine the argument from scope. Although this would not be an ideal theoretical situation, it will do for my purposes.

I have argued that complex demonstratives and definite descriptions are similar in their scope taking properties. One important, but perhaps not decisive, idea is that the current argument is enhanced by the hypothesis that definite descriptions are quantifiers. The hypothesis that definite descriptions are quantifiers is one of the most prominent in the literature, and might support the claim that complex demonstratives are quantifiers too. This will work if one makes an important assumption, one that also underlies the argument from scope, namely that scope is a reliable enough diagnostic for the syntactic and semantic categories of DPs. However, we need not rely on this kind of argument from the scopal similarity between complex demonstratives and definite descriptions to their semantic category. This is not because of doubts regarding the quantificational character of definite descriptions, but rather because we have reasons *not* to rely on scope as a quick guide to syntactic and semantic category in the first place.<sup>23</sup>

Scopal possibilities do not discriminate between referential and non-referential expressions. Thus, the data I presented show that scope, in negative and non-negative contexts, is a much more limited phenomenon than is usually acknowledged. This seems to be a data-point for the referentialist about complex demonstratives. But our discussion also shows that, in intensional contexts, scope is a more maximal property than the participants in the debate over the scope of definites have admitted. Indeed, in intensional contexts complex demonstratives pattern with definite descriptions, but not with proper names. This seems encouraging for the quantificationalist and, more generally, for the non-referentialist. We are in the position to draw two safe conclusions.

23 For a similar position about scope, but one that is primarily intended to cast doubt on the quantificational accounts of (at least some tokens of) definite descriptions, see Glanzberg (2007). The direction of my argument is exactly the opposite: I would like to cast doubt on the success of referentialist accounts of complex demonstratives. See also the argument in Rothschild (2007a) against the view that scope considerations are strong enough to show proper names are semantically distinct from definite descriptions.

20. First, if our discussion is on the right track, it very much weakens the argument from scope, which claims that definite descriptions display scopal properties not shared by complex demonstratives and thus cannot be quantifier phrases. Hence, Scope Economy provides a reason why the argument from scope is inconclusive. It is due to the semantically ‘fruitful’ interaction of determiner phrases that scope is allowed (and, possibly, further syntactic constraints<sup>24</sup>) rather than to their syntactic and semantic category (be it quantificational or non-quantificational), strictly speaking. By semantically ‘fruitful’ interactions I mean, in line with the economy-theoretic reasoning, interactions between quantifiers that can provide novel truth-conditional contents. According to Scope Economy, quantificational phrases like *every student*, definite determiner phrases like *the student* and *that student*, and proper names like *John* have the same scopal (in)flexibility when combined with, say, a universal quantifier.
21. Secondly, on closer inspection, when the context is carefully set up, complex demonstratives always match the scopal properties of definite descriptions. Therefore, even if complex demonstratives are not quantificational, it is still plausible that they are non-referential, i.e., not *directly* referential. The interactions with intensional operators surveyed here seem to indicate that the content of complex demonstratives and definite descriptions is not invariant under evaluation at various possible worlds.

There is another general argument that corroborates the same conclusions. One can make a syntactic argument in favour of the view that complex demonstratives and definite descriptions are similar, and thus that complex demonstratives are non-referential.<sup>25</sup> A promising argument for the claim that complex demonstratives and definite

- 24 Scope Economy does not fully *explain* why certain scope constructions are not possible: additional syntactic constraints are needed to explain this. What the two principles show is that we cannot *detect* scope for some unknown reason (including reasons pertaining to economy), even if in principle scopal flexibility might exist. PARSE tells us that this doesn’t happen for some reason (see fn. 8). On the other hand, it should be kept in mind that the predictions of Scope Economy are robust (Fox 2000). In other words, until we find what causes the Scope Economy not to detect the ‘in principle’ possible, truth-conditional novel, scope configuration, it is reasonable to suppose that Scope Economy does, in fact, apply at the interface syntax/semantics and that it thus detects the lack of scope flexibility. So until we find a deeper explanation for the scope of complex demonstratives, the hypothesis that the two principles do constrain the interface syntax/semantics provides us with a reliable tool for detecting scopal properties. As I show at the end of the chapter, the controversy-based account of scope (see chapter 2) can recover the predictions of Scope Economy, but it remains to be seen if it can deal with the problem just alluded to in a less stipulative manner.
- 25 King (2001) made a similar type of argument relying on antecedent contained deletion and weak crossover data, but that argument is very problematic, as shown by Altshuler (2007).

descriptions have the same syntax is one that depends on the feature composition of articles and demonstratives in English-type languages, rather than on their scopal properties, as the argument from scope would have it. Indeed, it was argued that a principle of feature-economy governs the transformation of demonstratives (originally specifiers of DPs) into articles (heads of DPs).<sup>26</sup> This is an argument that definite descriptions and complex demonstratives (and perhaps the standard quantifier phrases) have the same syntactic category. If we corroborate this syntactic conclusion with the discussion of scope in this section, we have reasons to think that complex demonstratives and definite descriptions are more than just similar. This seems encouraging for the non-referentialist. However, I won't insist on this type of argument here, for the following reason. Some referential theorists are ready to grant that the syntax of both types of definites is the same, and even that the two have the syntax of quantificational phrases, but she still thinks that some complex demonstratives are semantically referential (see fn. 39). Now, I'm not at all enthusiastic about this argumentative move (which indeed seems to me to be *ad hoc*), but nor do I have a strong argument against it. A strong argument would be one that shows that the syntax of complex demonstratives implies a non-referentialist semantics of complex demonstratives. Since I don't know a completely convincing argument of the latter type, I don't think that the referentialist will be swayed by the syntactic argument. Therefore, even if this syntactic considerations are important, their dialectical force is, in the present context, quite limited.

### 6.3 BINDING AND ECONOMY

In the coming discussion, I shall provide an argument that, I claim, will tip the scale more decisively in favour of non-referentialism about complex demonstratives. So far, I have argued that the scopes of complex demonstratives and certain alleged quantificational phrases, such as definite descriptions, look very much alike, and that this suggests that the argument from scope that complex demonstratives are not quantificational (but rather referential) fails. I have not yet established that complex demonstratives are non-referential, although I rendered the hypothesis more palatable by casting doubt on the argument from scope. In this section, I argue from binding considerations that complex demonstratives are in effect best seen as non-referential phrases. The key point is that the syntactic and semantic constitution of a complex demonstrative should allow it to take different values in different situations (or possible worlds). This is possible only if the

<sup>26</sup> See van Gelderen (2007) for the feature-economy based argument. See also Abney (1987, 177ff) for a view that takes *the* and *that* to be determiners.

descriptive material expressed by a complex demonstrative is semantically (i.e., truth-conditionally) relevant.

I shall be using a principle of economy governing binding patterns (Binding Economy). One of the key theoretical roles of such a principle is to preserve the insights of binding theory in the face of apparent counter-evidence. Hence, in using this principle, I shall thereby assume that the traditional binding theoretic considerations are both empirically and conceptually fruitful generalisations that a semantic account should preserve and accommodate.

#### 6.3.1 Binding conditions, coreference, and economy

Binding theory regulates the referential dependencies between pronoun, reflexives and the so called ‘full’ noun phrases (e.g. definites, proper names). In particular, it consists of three principles/conditions (A, B, and C) that deal, in turn, with reflexives, pronouns and full noun phrases. Of particular interest for the coming discussion are principles B and C. I shall introduce these principles later on (but see also chapter 3 for more context on binding theory).

It has been argued that in order to vindicate the principles of binding theory we need a distinction between binding and coreference, and some principle of economy to handle the binding and coreferential structures (see fn. 28 for references on this argument). If we use these tools, we can account for some apparent violations of binding principles. I take coreference, as well as the more fundamental notion of reference, as a broader notion which encompasses not only expressions standardly assumed to be referential, e.g. proper names, but also expressions with non-individual denotations (i.e., values which are not entities, semantic objects of type  $\langle e \rangle$ ). These expressions will be considered referential in the broader sense, and thus the notion of coreference applies to them as well. (So this assumption is consistent with our non-referentialist allegiance.)

If coreference is, in a sense, a broad notion, it is, in a theory-internal sense, a restrictive one. Coreference is a restrictive notion in the following sense. Two expressions can be coreferential, in the strict sense assumed here, only if neither of these expressions is referentially dependent on the other. That is, we are in a (‘coreference’) situation in which two expressions  $e_1$  and  $e_2$  refer independently to the same thing, rather than in a situation in which  $e_2$  inherits its referential properties from  $e_1$ , or *vice-versa*. Intuitively, binding involves linking two expressions that thereby come to have the same denotation, whilst coreference means that two expressions have the same denotation without being linked. Two expressions are coreferential only if they are not bound. In other terms, the two expressions are coreferent just in case they are not coindexed at the syntactic level (the level of logical form, LF) and thus their semantic values are not synchro-

nised *via* the mechanism consisting of the  $\lambda$ -abstraction rule plus the assignment function at the semantic level.<sup>27</sup>

The aim of the following argument is to show that in order to generalise the principles governing binding, we need to make the assumption that the meanings of complex demonstratives are non-referential. For this purpose, I shall extend the discussion of the so called *obviations* of binding theory—which in turn are motivated by the principle of economy and some pragmatic reasoning—to complex demonstratives, following suggestions by Heim (1998). As Heim suggests, it is clear upon examination of the relevant cases that the principle of economy applies also to full noun phrases, not just to pronouns, as initially proposed by Reinhart.<sup>28</sup> Building on this idea, we get a general argument that economy-principles involve non-referential complex demonstratives.<sup>29</sup>

Binding Economy—or what Reinhart and Heim call the *Coreference Rule*—is a principle that depends on the notion of *(in)distinguishable interpretation*. Its main effect is to introduce more flexibility in the binding rules, that is, to allow for *obviations* of binding theory. To a first approximation, obviations are benign exceptions to the general principles of binding. Here is the intuitive statement of the principle:

**BINDING ECONOMY** Accept obviations of binding principles only if such obviations are not semantically vacuous, i.e. produce some distinct interpretations from a given sentence.

The economy principle will become clearer once we consider its concrete applications. For now, we know that the principle preempts indistinguishable interpretations, but allows distinct (or distinguishable) interpretations. In order to see what sort of interpretation is referenced by Binding Economy, we have to see what these interpretations are made of. Heim (*ibid.*, 213ff.) argues that in order to make

27 See e.g. Heim and Kratzer (1998, 269ff.) for the semantic details pertaining to the distinction between binding and coreference.

28 Several versions of Binding Economy approach give an account of pronouns and/or proper names similar to the one I propose for complex demonstratives (Büring 2005; Elbourne 2005; Heim 1998; Reinhart 2006; Schlenker 2005). My extension of the economy-considerations to complex demonstratives is very natural (cf. Heim 1998, 222 ff.) and even required if the economy principle is to give a general account of binding phenomena under further plausible syntactic and semantic constraints. Moreover, the ensuing account of complex demonstratives as non-referential is in line with arguments to the effect that complex demonstratives share important features with definite descriptions. See also the arguments in Elbourne (2008) who is partly motivated, as I am, by economy phenomena.

29 Note that Heim's analysis targets principle B of binding theory, and she explicitly refrains from extending it to principle C. I show that principle C also lends itself to an economy-based treatment, which involves treating complex demonstratives as semantically (if not also syntactically) complex. It is likely that principle C should be revised. Since in chapter 4 I proposed a different, 'denotational economy' framework for binding anyway, I won't worry too much about the problems that principle C faces. The discussion that follows should be taken as the first step towards integrating the principle C phenomena in the denotational economy account.

the economy principle descriptively adequate we need *inter alia* to define interpretations in terms of individual concepts, rather than in terms of directly referential expressions. An individual concept (or guise) is a function from worlds to individuals satisfying conditions which may, but need not, be given contextually.

A standard example will clarify the main notions. Consider then, Chris and Lora, who are looking at a candidate for some office, and inquire into the identity of that candidate. All they know about the identity of the candidate, at this point, is that the candidate is speaking on a soapbox. This is also the definite description they would use to pick out the candidate, since it is perceptually salient that that person is speaking on the soapbox. In this context, Chris says speaking about the candidate in question: *She* [the speaker on the soapbox] *must be Zelda, since she's praising her to the sky*. In doing so, the utterer uses a context-sensitive guise: the pronoun *she*, used on an occasion in which an individual speaking on a soapbox is salient, takes as semantic value a guise, or, in more Fregean terms, a mode of presentation of that salient individual. On Heim's account, the pronoun *she* in the given context, denotes a guise, which is a function from worlds to unique female individuals on a soapbox at each world, that is, roughly, the unique female individual that at the world in question satisfies the condition of speaking on a soapbox. It should be stressed that the guise is not the female individual, but the *function* that yields this individual.

But what guise would a complex demonstrative denote in sentences such as *That man is funny*? Extending the previous definition of guises, we can say that the guise which is the semantic value of this complex demonstrative is the function from worlds to unique men that are *distal* (or far off in some straightforward or figurative sense), and may satisfy some further contextually given condition. The guise in the minimal form presented in the present example is not supplied by the context, but, naturally, further contextual descriptive material can be added to the condition *unique distal man*. For instance, the guise may be something akin to the meaning of the definite description *the unique distal man speaking on BBC4*, and the referent of the complex demonstrative is the individual who satisfies that description, if there is such a salient individual in the context of utterance.<sup>30</sup> So the descriptive material that the guise consists of is not limited to

<sup>30</sup> Indeed, guises are nothing else than Fregean Senses (see Frege 1997). According to Frege, the Sense is the way in which an object (content) is given. Heck (2002) argues that we need Sense in order to account for the possibility of communication and understanding, even if, according to him, the direct referentialist is right that demonstratives have singular contents. Our argument shows that Sense is indeed required, in order to make sense of the apparent violations of the binding principles, and in order to establish more precisely and correctly the domain of applicability of the binding theory. This is done by positing economy principles. To be sure, an important aspect of positing guises is to meet pragmatic constraints in a way which is consistent with the generalisation of a theory of binding (see chapters 3 and 4).



the descriptive material in the surface form of a complex demonstrative, but some additional descriptive material can be contextually furnished. If no specific context is provided, as is the case with the above use of the complex demonstrative, competent speakers can nevertheless imagine a neutral context for it. Then, the demonstrative will denote a more abstract guise, like the guise of *that individual that I'm demonstrating now irrespective of who that is*.

Providing a full semantics in terms of guises is beyond the purposes of this chapter, but two remarks related to such a semantics are important. First, guises are independently needed in accounts of belief attributions. One has to explain why, for instance,  $a = b$  holds, but a person can believe that  $a$  is  $F$ , without believing that  $b$  is  $F$ . Guises help explain this puzzling fact, which is usually called *Frege's puzzle*. That person believes the same proposition under different guises, and is acquainted with the proposition (or with the corresponding fact) only under a guise. (The distinct propositional guise is determined by the distinct individual guise contributed by the expressions  $a$  and  $b$ .) We shall therefore account for the obviations of binding theory by extending the application of the notion of guise usually invoked to solve Frege's puzzle. Second, a further constraint on guises is needed in order to handle the behaviour of intuitively directly referential expressions. That is, we should be able to pick out the referent at the actual world as the referent of such an expression across possible worlds more generally. What we need is a configuration similar to actualised definite descriptions. I shall briefly return to this later (cf. fn. 41).

Adopting this view of guises commits us to a specific non-referential view of complex demonstratives, a view according to which they are semantic objects of type  $\langle s, e \rangle$ , functions from worlds to unique individuals. However, since I am neutral with respect to the specific semantics of definites, it may well be that the desired effect can be obtained by semantic values of other types, for instance, by a version of the quantificational view of DPs.<sup>31</sup> In principle, any semantic type that admits of a descriptive condition—indeed anything not directly referential—will support a similar, non-referential view. I shall provisionally take the denotations of complex demonstratives to be individual concepts. Guises offer us a good way of defining the notion of indistinguishable interpretation that Binding Economy makes use of. We still owe an explanation of how linguistic economy works

<sup>31</sup> See Rothschild (2007b) and especially Hawthorne and Manley (2012) for analyses and developments of the 'restrictor' analysis of definites. These accounts use the semantic resources of quantifier domain restrictors (and presuppositional contents restricting the value of these restrictors) in order to cover the specificity effects of definites. As Hawthorne and Manley suggest, this restrictor analysis is compatible in its essentials with other theories since the condition that can be built in the restrictor can equally well be built in other parts of the semantics of definites.



and why it allows for obviation of binding principles. This will make more plausible the non-referential view.

### 6.3.2 Condition B cases

Condition (or principle) B of binding theory requires that pronouns should *not* be bound locally, in their domain. Further complications about how to define the local domain of binding aside, the core predictions of this principle are clear. Take, for instance, the proper names and pronouns in the following sentences.

22. a) John likes him.  
b) Sadie told her to wait for a week.

Uttered out of the blue, these sentences rule out interpretations to the effect that *him* refers to John and that *her* refers to Sadie. This restriction is standardly conceived as being syntactic, because we don't need to know anything about the reference or denotation of expressions in order to judge coreferential readings as inadequate. Intuitively, the condition applies prior to the semantic interpretation of the noun phrases in question, although of course it constrains their semantic interpretation. Since Condition B is robust and quite general, we need an account of the interface between syntax and semantics that is compatible with this condition.

In this section I develop an economy-based account of complex demonstratives in the Condition B configurations taking my inspiration from Heim (1998). The main binding economy examples involving complex demonstratives are given below. (I represent the covaluation of two expressions by italicising them. By covaluation I understand sameness of reference, leaving it open if it is due to binding or coreference.)

### 23. Obviations of Condition B<sup>32</sup>

- a) (In response to someone looking for John.) That man put on John's coat, so *that man* must be *him*.  
b) – Is that woman Zelda?  
– *That woman's* praising *her* to the sky. It must be Zelda.  
c) If everyone hates a man, then *that man (himself)* hates *him*. (ex. (19), *ibid.*, p. 222)  
d) Everyone here – Mary, Sue, that guy – has something in common. Mary hates that guy, Sue hates that guy, and *that guy* hates *him* too.

<sup>32</sup> An example similar to (23a) was first discussed by Higginbotham 1985, p. 570 and credited to Nancy Browman.

These examples originally targeted pairs of pronouns, or pairs consisting of a proper name and pronoun. I modified them in order to target pairs of complex demonstratives and pronouns. The result is that we are still in a Condition B configuration (pronouns should be free in their domain), but this time we have complex demonstratives appearing in such a configuration, as potential antecedents. One ought to explain why although these pronouns are in a Condition B configurations, they still seem locally bound. This constitutes an apparent violation of the Condition B.<sup>33</sup> The key idea is that these are not violations of *binding* principles, since, in fact, they are not in a binding configuration. They involve coreference, which looks like binding but is nevertheless different. The difference is that whilst binding amounts to coindexation (or a more minimal mechanism that does the same job), coreference relies on coreferential but non-coindexed lexical items. We are now in a position to draw the relevant consequences for the syntax/semantics of complex demonstratives.

As I have suggested, Binding Economy appeals to the notion of (in)distinguishable interpretation. There are two relevant notions of (in)distinguishable interpretation, corresponding to the following two types of cases: (i) cases that directly require guises (23a)–(23b), and (ii) cases that require structured meanings (23c)–(23d).<sup>34</sup> Let us start with the type (i) cases.

Examples (23a)–(23b) involve different guises of, as it happens, the same individual, and thus obviate Condition B by conveying new truth-conditional contents, even if, at the level of reference or content, the propositions expressed *could* be the same. So, in (23b), the

33 The data we are considering are *not* best conceived as binding theory violations, but rather obviations (see also Buring 2005). They are obviations because we get covaluation of binding expressions where binding theory predicts that we should not have covaluation. They are not pure violations because we may assume, as we did, that there are two complementary types of covaluation, binding and coreference, and that the binding principles concern only the former. Thus, we may get covaluation *via* the latter route, that is, *via* coreference. The existence of the coreference option makes clear why our pre-theoretical intuitions suggest violations of the binding principles (although, once again, in fact the violations are only apparent): we take covaluation to be determined *via* binding, when in fact the covaluation is determined *via* coreference.

34 What we have called “structured meanings” are structures that are more fine grained than truth-conditional contents. These can be seen as Russellian propositions. It may seem striking that Binding Economy needs to be formulated both in terms of Fregean senses and Russellian propositions. One may think that advocates of Russellian propositions could mine Binding Economy for evidence that grammar, broadly speaking, is sensitive to such structured propositions and properties. (See King (2013) for an argument that non-trivial syntactic structure transfers to structured meanings and J. Collins (2013) for an argument to the contrary.) However, this would not be conclusive, since arguably the solution to the binding puzzles does not depend on the presumed metaphysical nature of the structures involved. Thus, we may well consider that the structured meanings are Fregean senses or modes of presentation. In chapter 4, I have assumed such a general notion of Fregean sense (comprising what I have called *individual* and *complex guises*), but for pragmatic rather than metaphysical purposes.

demonstrative *that woman* will take as semantic value the guise  $F(w)$ , whereas the pronoun *her* will be anaphoric on *Zelda* and thus will be valued  $G(w)$ , the memory entry for *Zelda*. For present purposes it is immaterial whether the descriptive material is represented at LF by filling a variable or whether the descriptive material is added at the interface.<sup>35</sup> What is important is that the semantics will treat complex demonstratives as having more fine grained (intensional) semantic values. Consequently, if the query in (23b) was made about a woman speaking on a soapbox, the salient guise will be something like *the distal woman on the soapbox in  $w_a$* . Supposing that indeed *Zelda* is the person demonstrated, the content of the demonstrative at the actual world ( $w_a$ ) will be *Zelda*. But the content is given *via* a guise. And it is the guise that is relevant for the binding relation. Provided that this guise will differ from the memory entry for *Zelda*, the semantic values of the demonstrative and pronoun will be different, thus meeting the refined condition B.

Similarly, in (23a) the binding obviation in the last sentence is pragmatically licensed because of the two different guises that are denotations of the complex demonstrative *that man* and the pronoun *him*. The guise of the former is a perceptual guise, and that of the latter is a description associated with John.

The analysis of the cases (i) is straightforward in broad outlines. The example (23c) is a familiar case in the literature on anaphora. It features a donkey anaphor, the demonstrative *that man himself*, which will referentially depend on the indefinite *a man*. (The demonstrative will be interpreted as *that man that everybody hates*.) The pronoun that obviates Condition B is used in order to highlight that we are dealing with a universal instantiation of a property (roughly, *hating a particular man*), rather than the ascription of another property (*self-hating*). Even if the universal instantiated property and the self-ascription end up having the same content, their communicative impact differs, due to their having different structured meanings. And it is their structured meanings that Binding Economy is sensitive to. This is another Principle B obviation that looks (but just looks) like a violation of that principle. Even if the complex demonstrative *that man* and the pronoun *him* end up coreferring, their informational uptake is different, and therefore permissible for reasons of linguistic economy.

We can see that not all these examples are based on comparing potential logical forms involving different guises, but it is important that some of them do. For instance, (23d) will be licensed by comparing differently structured propositions (or properties), whilst (23b) requires guises (see below). It is theoretically appealing to say that

35 The interface solution is faithful to the account of Reinhart (2006), but an alternative in which Binding Economy governs the interplay between two syntactic mechanisms was advanced by Heim (1998). I shall be neutral on the specific implementation of Binding Economy. Either implementation has essentially the same non-referentialist consequence for the semantics of complex demonstratives.

guises are always involved in enforcing the binding theoretic requirements. Accordingly, we'll have a binding theory uniformly formulated in terms of guises. In the next section I shall argue that guises are also required by Principle C cases (and in chapter 3 I make the same claim about Principle A cases). Crucially, this argument commits us to taking a stance on the semantics of complex demonstratives as well.

The main motivation for positing that guises are semantic values for binding expressions came from Condition B configurations, that is, from configurations that involve pronouns that appear to be bound in their local domain (but in fact aren't). Therefore, these considerations involve primarily pronouns. Note that we need to extend the conclusions about the semantic value of pronouns to the other expressions entering binding relations specific to Condition B. In particular, the antecedents of the pronouns in the Condition B configuration need to have semantic values that are comparable to the semantic values of pronouns. By comparable semantic values I mean semantic values which are evaluable as to their identity. In order to be compared the binding expressions have to have denotations of the same semantic type. When the semantic values are compared the following question has to be answered. Does the pronoun have the same semantic value as its antecedent? If it does, the binding condition is violated or obviated. If it doesn't, the binding condition is neither violated nor obviated. Of course, whether we are in a case of obviation or violation of the binding condition depends on what the context of utterance looks like, and, in particular, on whether the purported obviation serves any purpose in communication. The key idea is that complex demonstratives can play the role of antecedents that bind pronouns, and thus the semantic values of pronouns should be of the same type as that of complex demonstratives. In light of these considerations, complex demonstratives take guises as semantic values. This argument for positing guises will carry over, *mutatis mutandis*, to the Condition C cases.

### 6.3.3 Condition C cases

I turn next to cases where complex demonstratives do not play the role of potential antecedents (or binders), but that of potential bindees.

It is worth reminding ourselves that the binding Condition C governs constructions such as (24).

24. a) He likes John.
- b) She told Sadie to wait for a week.

In these constructions, there is a clear prohibition against identical reference. The pronouns and the proper name in each of these sentences are interpreted by default as having distinct referents. As

was the case with Condition B, Condition C seems quite general and robust.

In light of these observations, the following examples need explaining.<sup>36</sup> I take complex demonstratives to be R-expressions or full noun phrases (referential expressions, broadly speaking), thereby subject to Condition C. As before, the binding expressions that have the same denotation, and thus seem referentially dependent, are italicised.

25. *Obviations of Condition C*

- a) (She must be talking about herself.) *She's* praising *that woman* too much.
- b) *He* put on *that man's* coat. So he must be him.
- c) Only *he* thinks *that guy* is smart.
- d) I know what Ann and that guy have in common: she thinks that guy is terrific, and *he* thinks *that guy* is terrific too.

The reasoning should be familiar from our previous discussion of binding obviations. What is interesting about these cases is that they seem to violate Condition C of binding theory. But almost the same constructions (e.g. *He thinks that guy is smart*) are subject to Condition C, so something special must occur in our (25) cases. The apparent anomaly is that the complex demonstratives and pronominals in each of the sentences seem to have the same referent, but, contrary to Condition C, the sentences are acceptable. The solution to this puzzle is to conceive of these constructions as involving obviations of a binding condition. As pointed out earlier, there are two—necessary and mutually consistent—ways to go about binding obviations. These two approaches to obviation directly correspond to the two cases of Condition B obviation above. Cases of type (i) need an account in terms of guises (25a)–(25b), whilst cases of type (ii) are those that require structured meanings (25c)–(25d).

As before, cases of type (i) are solved if we assume that binding expressions refer to individuals under guises. Indeed, if we posit that the denotations of the potential binding expressions (e.g. the pronouns, complex demonstratives, and names) are guises, we can explain the obviation of Condition C. On this view, Condition C operates on guises, requiring the pronouns and the complex demonstratives in the domains of these pronouns to denote different guises. Moreover, the appearance of a Condition C violation in the (25a)–(25b) examples is due to the pronouns and complex demonstratives' ending up referring to the same individual, under two different guises.

For instance, (25a) can be uttered naturally on an occasion where the identity of a person is at issue. The audience of the context doesn't

<sup>36</sup> Examples of the kind given in (25c)–(25d) were first discussed in Evans (1980).

know whether a particular person, referred to using the demonstrative *that woman*, is Zelda or not. The utterer reasons that that person must be who the audience thinks she might be. Suppose that on that occasion the person in question (the referent of the demonstrative *that woman*) is speaking on a soapbox. The guise which is the semantic value of *that woman* will then be something akin to *that woman speaking on the soapbox*, a guise that is distinct from the guise stored in long-term memory for that person. (We assume that both the speaker and the hearer know her, say, know that she is called *Zelda*, and may have further information about her.)

A similar account can be given for (25b). However, we need a special context to make sense of this binding obviation. Suppose the speaker (Mary) is, in that context, only slightly acquainted with a man and among the few things she knows about him is that he has a nice coat. Seeing a person putting on that nice coat, Mary utters (25b) and thereby wonders whether that person is the man she is acquainted with. Even admitting that that man is identical to the person putting on the coat, Mary's binding expressions refer to him by different routes or under different guises. Binding Condition B is sensitive to guises, which are different for the two expressions, rather than to the referent, which is the same for the two expressions.

In contrast, when different guises are not provided contextually, the coreference readings express different structured propositions than the binding interpretations. These are cases of type (ii). To illustrate how structured meanings produce distinct interpretations consider the following example. Suppose a person thinks that Ann is smart, and that person is Ann herself. Now, this unique situation can be correctly described in two distinct ways. There is an obvious difference between the proposition that Ann thinks of *herself* as being smart, and Ann's thinking of *Ann* as being smart. The propositions thought by Ann are differently structured: one concerns *Ann's being smart*, whilst the other concerns *the thinking agent's being smart*. But the propositions have the same truth-conditions because Ann *is* the thinking agent.<sup>37</sup> Likewise, our examples (25c)–(25d) give birth to two distinct readings under the binding and coreference structures. The coreference structures end up being preferred thanks to their conveying distinctly structured propositions, as a consequence of Binding Economy. So both examples can be clearly accounted for by appeal to distinctions between expressions with the same content but different structured meanings.

<sup>37</sup> It might help to think of the distinction between the two structured meanings in this context as the distinction between purely *de re* interpretations and *de se* (first-personal) interpretations. Thus, Ann might think she has a property, without knowing that she herself has the property. However, note that the distinction between structured meanings is independent of, and more general than, the first-personal vs non-first personal distinction. For discussion of the interaction between structured meanings, first-personal interpretation and binding, see chapters 2 and 3.



Example (25c) needs a proper context in order to be considered altogether felicitous. The context may be, for instance, this. A group of individuals doubt that a particular one of them, say X, (referred to by *that guy*) is smart, but there is an individual who nevertheless thinks that X is smart, namely X himself. Now, (25c) obviates Condition C because it conveys a message which is distinct from the message that would be conveyed by binding, viz. the message obtained if *that guy* would be replaced by the reflexive *himself*. That distinct message relies on coreference between *he* and *that guy*, and consists of the structured meaning to the effect that someone satisfies the property of *thinking that X is smart*, which is different from the property of *thinking of oneself as being smart*. It so happens that a unique individual, X, realises both of these properties, but the properties have different structures.

In the example (25d), the obviation happens due to the novelty of the structured meaning of the clause *he thinks that guy is terrific*. This clause conveys the message that the property of *thinking that a person, say X, is terrific* is shared by several individuals. Once more, this property is different from the property of *thinking of oneself as being terrific*, although the situation described by predicating those properties of X is, by assumption, the same situation. In other words, the property is differently structured. According to our hypothesis, Binding Economy sees such interpretive differences and licences obviation of Condition C.

In summary, my discussion of the Binding Economy principle shows that in order to make sense of the apparent violations of Conditions B and C, we need to posit that complex demonstratives take guises as semantic values, and thus that they refer indirectly *via* a Fregean sense. If we are further assuming one of the two versions of the Dilemma Hypothesis (see discussion above), the complexity of the semantic values of complex demonstratives implies that they are either quantificational, or, less restrictively (but more generally) non-referential. Since my task is to choose between referential and non-referential expressions, I take the above observations to support the more general (and neutral) non-referentiality thesis. I have thus provided further support for a non-referential account of complex demonstratives.

It is worth stressing that the implications of Binding Economy are more general, and have application beyond complex demonstratives. In particular, the same non-referentialist conclusion holds for proper names and definite descriptions too. Focusing on the latter, it is suggestive that guises look like the denotations of implicit descriptions. My claim is that definite descriptions can be felicitously substituted for complex demonstratives in both Condition B and Condition C configurations. It is easy to see that definite descriptions give rise to the same obviation of binding theory as complex demonstratives



do. Therefore, they too should take guises as semantic values on the occasion of those utterances. This is not to deny that there may be relevant differences between definite descriptions and complex demonstratives. Nevertheless, the behaviour of definite descriptions and complex demonstratives seems to be identical in the binding patterns presented here, and, as I suggested, these examples provide motivation for an elegant generalisation to the effect that definites have guises as semantic values. The conclusion that both types of definites have similar semantic values also fits nicely with the argument presented in the first part of the chapter, which shows the scopal similarity between definite descriptions and complex demonstratives.

#### 6.3.4 Interim conclusions about binding

I have argued that the content of complex demonstratives varies with possible worlds, since their intensional semantic values are potentially non-constant functions from possible worlds to other types of semantic values. Thus, the referentialist cannot maintain her direct reference thesis. Binding Economy entails that the obviation of binding theory occur precisely when the direct reference of the binding expressions (pronouns, complex demonstratives etc.) fails. This is because the descriptive material introduced by guises makes the truth-conditional content of complex demonstratives and pronouns vary with the world of evaluation.<sup>38</sup> This is also corroborated by our discussion of the scope interactions between complex demonstratives and intensional operators.

I do not deny that in certain contexts complex demonstratives can indeed be used in a seemingly directly referential way to express singular contents. But, from my theoretical perspective, such uses are only special cases of complex demonstratives whose contextual semantic value is a function which is constant across possible worlds. What I deny is that such referential uses have a significant impact on the linguistic meaning of complex demonstratives, and, in particular, that they show that complex demonstratives denote individuals or, equivalently, have semantic values of type  $\langle e \rangle$ . According to the constraints imposed by the principles of economy, complex demonstratives need to have some other type of semantic value, for instance individual concepts  $\langle s, e \rangle$  (as on my provisional assumption), predicates  $\langle e, t \rangle$ , or quantifier phrases  $\langle et, t \rangle$  (or an intensional version of predicates or quantifiers).

<sup>38</sup> The denotational account of binding proposed in chapter 5 will have the same consequence, since the notion of guise plays a crucial role there too.

## 6.3.5 Referentialist ways out

The friends of referentialism might pursue three main strategies in order to evade the conclusion drawn from binding economy phenomena. Firstly, one might try to reformulate Binding Economy in terms of purely (directly) referential notions, thus equating complex demonstratives to terms, such as (type  $\langle e \rangle$ ) individual constants or individual variables, rather than guises. Secondly, one might claim that the direct referential uses of complex demonstratives are not those that Binding Economy targets, but rather an independent category. Thirdly, one might try to argue that Binding Economy is mistaken. I shall address all these strategies in turn, providing some good, but admittedly not definitive, objections against them.

*First strategy*

One strategy the referentialist may adopt is the following. Binding Economy phenomena are a mixed bag. We seem to have examples where guises are at the forefront. But we also seem to have examples where other kinds of structured meanings are important, that is, the examples where the economy principle is sensitive to the universal instantiation of a property. The latter cases are neutral with respect to the semantic values of the expressions involved in binding relations. The referential account is perfectly compatible with Binding Economy as used in these latter cases. The question then becomes whether we can reduce the former cases to the latter cases, that is, whether we can make the economy principle sensitive exclusively to structured meanings rather than to guise-valued complex demonstratives. The solution would work along the following lines. When, in the process of determining the referential dependency, we encounter what looks like a binding theory violation (at the level of individual referents!), we process up to a higher node in the tree, take the denotation corresponding to that node, intensionalise (by sticking in a world argument), and look for pragmatic cues that the resulting denotation is useful for communicative purposes. If some pragmatic rationale is found, a binding theory obviation is allowed precisely as in the cases where structured meanings matter. If this can be done, then we'll get a simpler account in terms of structured meanings, rather than in terms of structured meanings *and* individual concepts. More importantly, according to this account complex demonstratives can be conceived of as (directly) referential.

However, there are good reasons to think that the two cases are essentially different, and cannot be accommodated by a principle of economy that is sensitive to a single kind of semantic value, namely, structured meanings. It is easy to see that the communicative points of uttering sentences of type (i) and (ii) are clearly distinct. In one case the identity of a person is at issue: the point is to make an infor-

mative statement to the effect that two possibly distinct individuals are in fact the same. And reference to possible individuals can only be made through the lexical items that have individual contents. In the other case the point is to convey universal instantiation of a property (e.g. *hating a man*), which is different from attributing a reflexive property (e.g. *self-hating*). In this case, the denotation of more complex expressions is referenced by the economy principle.

As I argue in chapter 3, it is both theoretically and empirically appealing to see the two types of semantic value needed in stating the principle of binding economy as special cases of Fregean guises. In any event, however we choose to conceive of these semantic values, the key point is that both types of semantic values are needed. In particular, individual guises are needed. Positing individual guises as semantic values preserves a localist insight already present in binding theory and central to linguistic theory more generally. Some linguistic hypotheses are necessarily stated in terms of syntactic or semantic properties of lexical items (broadly speaking, including functional items), rather than only in terms of properties of more complex expressions or linguistic structures. This is not a matter of convenience, but rather an essential property of certain linguistic phenomena. Indeed, in binding theory, binding relations are grammatical or ungrammatical partly in virtue of the *intrinsic* features of noun phrases. To be sure, further structural requirements—e.g. c-command—may also be partly restricting the binding possibilities, but the key idea of binding theory is that structural properties are not the only determining factor. The binding properties of lexical items depend in part on their intrinsic features. Thus, we can remain conservative with respect to binding theory for cases of type (i), cases involving guises under which the referents of binding expressions are given. On the other hand, we have to put up with type (ii) cases, which involve structured meanings (or complex guises), since these cases are not reducible to local properties of lexical items. Therefore, contrary to the suggestion made earlier, we still need Binding Economy to be sensitive to both types of semantic value.

#### *Second strategy*

As mentioned above, the second escape route is to circumvent Binding Economy phenomena altogether. That is, the referentialist might claim that the implications of Binding Economy are orthogonal to her claims about complex demonstratives.

There are two possible claims about complex demonstratives that may be pertinent for the referentialist position in this connection: (i) a claim about the relation between character and content, and (ii) a claim about the relation between syntax and semantics, which can be spelled out in two ways, according to whether we see the object of semantics as being (iia) meaning *qua* character or (iib) meaning *qua*

content. (I understand content in the standard way, as a function of character.) To elaborate, linguistic meaning—the object of study of linguistic semantics—may refer to several kinds of lexical information. I am interested here only in the *type of semantic value* encoded in the linguistic meaning of complex demonstratives or, alternatively, in the character of complex demonstratives.

The connection between syntax and linguistic meaning, (iia), is not something that the referentialist position is concerned with. A referentialist is concerned with content. I think that in the end how one conceives the interface between syntax and semantics, (iia), does have an effect on one's view of content. I shall return to this point.

The referentialist is then interested in the claims (i) and (iib). The claim (i) is that the structure of character (linguistic meaning) lacks a certain sort of implication for the structure of content. The claim (iib) is that syntactic structure lacks the same sort of implication for the structure of content. The sort of implication that these structures lack is, naturally (from a referentialist perspective), the implication that the contents are non-singular. Character—whatever its structure—may be just a way the singular content of a complex demonstrative is given. The syntax of complex demonstratives may take different forms (even the form of standard quantifier phrases), but, the referentialist argument runs, the claim that contents are singular still holds true all the while.<sup>39</sup>

I shall not dispute these referentialist claims directly. I agree with the referentialist that various mismatches between the structure of syntax and linguistic meaning, on the one hand, and the structure of content, on the other, may well exist, and thus that content can be singular and simple even if syntax and linguistic meaning, are, in some sense, complex. Of course, if the singularity of content is all there is at issue, the position defended here (non-referentialism) and referentialism will turn out to be compatible after all. However, there is a feature of our account that may escape notice. Returning to the way we conceived the relation between the syntax of complex demonstratives and their semantics (linguistic meaning), an important feature was that the logical form of complex demonstratives is interpreted as a guise rather than as an individual. And this means that the alleged singular contents of complex demonstratives are not direct (and thus rigidly determined) contents. In other words, our appeal to guises as denotations of complex demonstratives, for the purposes of vindicating binding theory, prevents direct contents. Hence, what we think about the interface between syntax and semantics (iia) has unavoidable repercussions on the type of contents that complex demonstratives are assumed to have.

<sup>39</sup> Such a position, to the effect that complex demonstratives have the same syntactic form as quantificational phrases but the semantic structure of referential expressions, is indeed endorsed by Braun (2008a, p. 65).

The referentialist might try to argue for a strong claim to the effect that guises are irrelevant to the nature of the content of complex demonstratives. But the strong claim cannot be true. The direct referentiality thesis does not hold for nominal phrases, inasmuch as the nominal phrases enter binding theory, and binding theory is formulated over guises. In response, the referentialist might endorse a weaker thesis, according to which complex demonstratives refer rigidly, although not directly but rather *via* guises (akin to the way descriptions like *the sum of 5 and 7* refer). But even if this claim holds for complex demonstratives in the Condition B and C configurations, it cannot be generally true, in light of the intensional cases discussed in §6.2.4. To accommodate the intensional examples, the referentialist thesis may be advanced for a *subclass* of complex demonstratives, trying to construe the implications of Binding Economy in such a way as to allow for complex demonstratives whose denotations are individuals rather than guises, and which will thus refer directly (and rigidly).

Accordingly, there is a more modest way of circumventing Binding Economy. I mentioned previously that provided that in some cases we need our economy principle to be sensitive to guises, binding theory should be uniformly formulated in terms of guises (functions from worlds to unique individuals), rather than individuals. But, the referentialist might contend, we need not do that in order to account for the previous phenomena. Instead, we may preserve binding theory sensitive to the identity of individuals (i.e. semantic values of type  $\langle e \rangle$ ), and switch to other semantic values (in particular, to guises) when the context requires it. A type-shifting operation may be invoked in order to switch from one semantic value to another. Thus, features of the context trigger the Binding Economy mechanism, which, in turn, triggers a type-shifting operation. It is only then, it might be claimed, that guises become available to the semantics. Given that such type-shifting operations are independently required (at least in some theories), this alternative seems *prima facie* plausible. The referentialist could try to exploit this alternative view, which is perfectly compatible with the data discussed here. It would then seem to follow that the binding economy phenomena are simply not cases of direct referential uses, and thus are not effective against the referentialist.

I can see why someone would like to hold on to this position, but I find it unsatisfactory, as it stands. The ambiguity account implied by the referentialist view of complex demonstratives (irrespective of whether it is implemented by type-shifting or other means) is, from a linguistic perspective, more problematic than a uniform account. The ambiguity view of complex demonstratives has several methodological shortcomings.

Firstly, the ambiguity postulated about complex demonstratives doesn't look like the normal lexical ambiguity (e.g. the ambiguity of *bank*). Concerning demonstratives, consider the expression *that*, which is ambiguous between a complementiser C, a relative pronoun, and a determiner D. Focusing on the *that*-complementiser and the *that*-determiner, note that only the latter takes number features in English, and person features cross-linguistically, e.g. in Romance. Compare such an ambiguity to the presumed ambiguity of demonstratives. Is there any linguistic (or cross-linguistic) motivation for postulating a difference between e.g. bound and referential demonstratives, or, more generally, between directly referential and non-directly referential demonstratives? I doubt that there is such a motivation pertaining to syntax or linguistic meaning (cf. Elbourne 2005; King 2001).

Secondly, the syntax and semantics/pragmatics of complex demonstratives are more constrained than the pragmatic meaning *qua* content, which depends crucially on the communicative intentions. If the ambiguity of complex demonstratives is pragmatic in nature, it may very well be *indeterminate* whether complex demonstratives express singular contents or relations (cf. Schiffer 2005).<sup>40</sup>

However, from the standpoint of the interface between syntax and semantics/pragmatics, it is much clearer what sort of structure complex demonstratives are required to have in order to abide by linguistic economy. Hence the syntax and semantics of complex demonstratives are safer criteria for non-arbitrarily classifying complex demonstratives. Firstly, our account is not threatened by indeterminacy: there may be indeterminacy about which proposition is being pragmatically expressed, but still the non-referential semantic value of the complex demonstratives may be playing its role in obviating binding theory. And this is its main explanatory task.

Secondly, the ensuing elegance of the syntax and semantics of complex demonstratives (and related expressions), and the promise of more unified view of DPs are further motivations for a non-referential account of complex demonstratives. We have no independent reason to isolate complex demonstratives from other binding expressions (e.g. definite descriptions) which behave, in all relevant binding respects, in the same way.<sup>41</sup> In fact, economy considerations aside, we

40 I find that there is no reliable source of evidence for or against the simple versus complex constituency of content. In principle, everything that would require a richer content can be mirrored by features of the character (linguistic meaning). So the whole argument for or against singularity of content seems to me to rely on intuitions. That intuitions about referents are not reliable is easy to see. After all, quantificational phrases like *at most one woman* and *at least one woman* or *only one man* will intuitively pick out a unique individual, but we don't want to conclude from this that such expressions are referential.

41 The main reason why one would prefer an ambiguity account is that sometimes complex demonstratives appear to be rigid and some other times they appear to be non-rigid. On my view, the rigidity and non-rigidity of complex demonstratives is a pragmatic feature built on a uniform semantic property of complex demonstratives.

have reasons to believe that the meanings of complex demonstratives *are* a particular sort of guises, namely individual concepts (Elbourne 2008), which further supports my claim that they are non-referential. In addition, there are conceptual advantages to having only one sort of semantic values for complex demonstratives instead of many, since we can then formulate the semantics of binding in terms of a unique type of semantic value. It is also a conceptual advantage to see the similarities between complex demonstratives and other types of noun phrases such as pronouns, definite descriptions and proper names. There is an emerging consensus that the semantics of such expressions is not best seen as directly referential.<sup>42</sup> Being able to preserve the similarities, we may at least remain open (if we don't get closer) to a unified semantic theory of noun phrases.

I think that the non-ambiguity account has methodological advantages. However, I admit that some theorists may remain unconvinced by the non-ambiguity desideratum. If one is swayed by intuitions about the singular contents and rigidity of complex demonstratives rather than by methodological considerations, one is free to endorse an ambiguity account. In this case, my argument would amount to showing that there is an important class of complex demonstratives that is non-rigid, and its semantic value is a guise. Note that my account of the relevant class of complex demonstratives remains non-directly referential, and the similarities between definite descriptions and complex demonstratives pointed out earlier are still in place. The ambiguity account is what results after factoring in the empirical consequences of the economy principles, and leaving out the methodological considerations of unity, generality, and simplicity. It is worth stressing that though this account is indeed maintainable (because coherent), once the argument from scope is proven to fall short, it is devoid of any empirical motivation. Until further motivation is provided, the referentialists would simply appear to be dogmatically clinging to their intuition of direct reference.

---

(We may account for intuitions of rigidity, pragmatically, by letting the descriptive material of the complex demonstrative contain a description roughly along the lines of *that individual identical to the individual demonstrated*.) Hence, we do not need to assume that there are two kinds of linguistic meaning of complex demonstratives, one rigid, and another non-rigid. Relatedly, a non-ambiguity account is better in terms of data coverage.

- 42 There are many recent analyses of noun phrases that lean towards non-referential view. I have in mind accounts of pronouns (Elbourne 2005), definite descriptions (Elbourne 2013; Fara 2001; Neale 1990; Rothschild 2007a, proper names (Elbourne 2013; Fara 2013; Matushansky 2008), and, of course, demonstratives (Elbourne 2008; King 2001). See also the different general accounts that propose to unify these broadly referential noun phrases in Elbourne (2013) and Hawthorne and Manley (2012). Although these analyses are incompatible in various ways, they are all non-referential.



*Third strategy*

Finally, there is a perhaps more radical strategy of indirectly defending the referentialist by objecting to principles of linguistic economy. This radical strategy might prove encouraging for the referentialist, insofar as it threatens the economy considerations adduced here. Such positions are readily available. Indeed, Heim (2009) and Roelofsen (2008) have expressed scepticism regarding Fox's principle of parallelism (Fox 2000), and Reinhart's division of labour between syntax and the interface (Reinhart 2006). However, there are several reasons why this scepticism should not deter us from siding with the non-referentialists. Firstly, even if some may find parallelism wanting in binding configurations with ellipsis (pertaining to the strict and sloppy readings), note that the kind of parallelism I relied on concerned scope, rather than binding. And parallelism may very well be a feature of scope even if it doesn't deal adequately with binding. It is true that Fox's predictions using Parallelism and Scope Economy have some independent problems (see D. E. Johnson and Lappin 1999), but the problems are not insurmountable. More importantly, I know of no direct comparative study of Fox's account of scope and other accounts of the same data. Thus, there are no actual promising alternatives. Until such an account is made *prima facie* plausible, it doesn't seem misguided to rely on Scope Economy. Parallelism is assumed in other areas of linguistic theorising (especially in theories of ellipsis), and a more general constraint on cognition (see fn. 10).

Secondly, I agree that the division of labour between syntax and semantics that is assumed by the standard economy accounts is problematic. I haven't surveyed all the possible interface economy accounts,<sup>43</sup> but, in chapter 3, I also express scepticism about the principles of economy introduced here. Nevertheless there is no guarantee that by giving up the interface economy principles, one will be entitled to a referential view of complex demonstratives. For even if these principles of economy are proven to be wrong in the long run, some of the regularities that they uncover may still be problematic for the referentialist. In fact, it is relatively easy to show that other accounts of the same data have the same non-referentialist consequences (see the 'consistency claim' in the conclusions).

## 6.4 SUMMARY AND CONCLUDING REMARKS

My purpose has been to establish necessary constraints on a semantic analysis of complex demonstratives, remaining neutral with respect to the final form that the semantics of such expressions should take.

<sup>43</sup> For instance, interface principles of economy, and the division of labour they secure between syntax and the semantics/pragmatics, are one of the tenets of the Minimalist Program, even in the more recent incarnations (see e.g. Reuland 2011).

The key constraint has been the requirement, due to Binding Economy, that the linguistic meaning of complex demonstratives contain a descriptive material, and that they at least sometimes have a possible world variant content. We can then claim, on methodological grounds of simplicity and unity, that *generally* complex demonstratives denote guises. Another constraint on the semantics of complex demonstratives is based on Scope Economy and Parallelism. I have argued that the syntax and semantics of complex demonstratives and definite descriptions should be similar in the sense that they both interact with intensional operators, but they don't interact with negation. Moreover, we saw that if Scope Economy is correct, even quantifiers are sometimes preempted from taking scope. However, it's worth stressing that, with respect to scope, complex demonstratives pattern sometimes with quantificational phrases and sometimes with proper names. For these reasons, I have concluded that scope is an unreliable mechanism for determining the syntactic and semantic category of complex demonstratives.

#### *Consistency claim*

Before concluding, I need to tie up an important loose end. At the beginning of the chapter, I claimed that Scope Economy is not essential to my argument and that basically the same assumptions on the basis of which I was arguing were also guaranteed by the account I defended in chapter 4—the denotational economy account.

Indeed, I contend that the denotational economy account inherits from the standard binding economy account some of its conceptual 'raw material'. One basic difference between the denotational and standard accounts is that the former relies on semantic/pragmatic principles, whilst the latter relies on syntactic/semantic principles. This difference pertains to the type of interface that the two accounts are serving. However, the difference uncovers a commonality, because on both accounts the grammar needs access to semantic information; after all, both accounts interface with semantics. Since guises are semantic values, what remains to be argued is that guises are essential to the denotational economy account.

Given the discussion in chapter 4, it is obvious that guises are essential to the denotational economy principle. Consider again the standard Reinhart-Heim case where identity is in question. Say that Mary, one of Zelda's acquaintances, watches television and upon seeing someone that looks familiar utters the following: *Is the speaker Zelda? She must be Zelda; she praises her to the sky.* The story is certainly familiar by now. The underlined expressions constitute an apparent violation of the binding principle B, which requires pronouns (e.g. *her*) to be free in such configurations. As I remarked, since the sentence is entirely acceptable, we have to explain its acceptability in a way compatible with the otherwise fruitful and quite general prin-

ciple B. The denotational economy account, explains the acceptability of the construction by letting *she* and *her* take as denotations different guises. For example, if in the context of utterance Mary happens to be gesturing at a person talking on the television, *she* takes as denotation the perceptual guise akin to the guise expressed by the definite *the person speaking on the television*, and *her* might inherit the guises that Mary associates with Zelda (perhaps a trivial guise that returns Zelda at every world). The denotational economy principle, Non-Redundancy, is thus observed, since there will be no redundancy in the sequence. On the denotational economy account—as on the standard economy accounts—the coreference of the two pronouns does not conflict with the binding principle, because the binding principle is formulated in terms of guises, rather than referents.

At the beginning of the chapter, in the sections dealing with scope, I argued on the assumptions that the regularities uncovered by Fox (2000) are correct. Fox uses the principle of Parallelism in order to argue—from pairs of potentially scope-taking sentences, where one of these sentences is elided—that the Scope Economy principle is a plausible restriction on scope. But I also suggested that Scope Economy and Scope Admissibility are coextensive, in the sense that whenever a sentence has distinct scopal readings, its implicature set (i.e., the set consisting of the disambiguated scopal interpretations and their scalar implicatures) is inconsistent. Since I can state Scope Economy in terms of Scope Admissibility, and there are independent reasons to think that Parallelism is plausible, I can run basically the same arguments that Fox did, and show that complex demonstratives and definite descriptions behave similarly with respect to scope. In particular, the argument shows that complex demonstratives and definite descriptions have the same effect on the scopal interpretation of elided sentences, a fact which encourages the conclusion that they both abide by Scope Economy (or, in our terms, Scope Admissibility) *in the same way*.

Therefore, even if I replace the standard principles of economy assumed in this chapter by the principles of economy for which I have argued previously (in chapters 2 and 4), the relevant non-referential conclusions remain in place. We have reason to believe that complex demonstratives have denotations that are more fine grained than individuals.

Going back to the main train of thought, I conclude that the thrust of the argument has been that we need a more flexible semantics for complex demonstratives, rather than a rigid, directly-referential one. My desiderata for a semantics for complex demonstratives are compatible with theories that treat complex demonstratives as quantifiers, individual concepts, or some sort of predicate. The present discussion is also compatible with a certain referentialist account, but one that lacks direct referentialist commitments. However, if what one wants

is a *direct* referentialist account, one needs to embrace an ambiguity account of complex demonstratives, which, I have argued, is *prima facie* methodologically inferior to a unified account.

From our perspective, direct singular contents have no particular explanatory virtue. The best strategy of argumentation is to start with some urgent empirical constraint (e.g. the apparent failure of binding theory), and then ask how best to conceive of the linguistic meaning of complex demonstratives. This may not do justice to the intuitions that the referentialist cherishes the most, but nevertheless it has some theoretical virtues that the referentialist constraints on semantic theorising cannot achieve. On the view endorsed here, the main challenge is not to come up with adequate semantic analyses for particular uses of complex demonstratives, but rather to build an account that does justice to the similarities and dissimilarities between the relevant expressions. The main role of an account of complex demonstratives is not to isolate particular uses, but rather to capture the behaviour and the syntactic and semantic nature of complex demonstratives in a way that also allows us to see the continuities and discontinuities between complex demonstratives and other expressions, such as definite descriptions, proper names, and quantificational phrases.<sup>44</sup>

This ends the study of the impact of economy on themes in the philosophy of language. As we have seen, the economy principles are explanatorily useful, and impose constraints on what we should take as structural properties of language (e.g. logicity) and as the proper semantic analysis of noun phrases (e.g. complex demonstratives). Previously in the thesis, I proposed two accounts of some aspect of scope and binding, which have an ‘economy’ flavour in the sense of endowing logical forms with grammatical properties relative to their alternatives and an independent ranking of these alternatives. Since my own proposals are essentially semantic/pragmatic restatements of the standard economy that crucially preserve the reliance on logical inference and guise-valued noun phrases, the results of the last two chapters should be safely obtained within the frameworks that I proposed.

44 There are further interesting interactions between complex demonstratives and several other linguistic constructions. These interactions deserve attention in developing an empirically well supported account of demonstratives. For instance, how do complex demonstratives behave in copular (identity) clauses? What are the syntactic and semantic differences and similarities between complex demonstratives and the standard quantifier phrases (e.g. *some woman*, *every article*)? How do complex demonstratives and the standard quantificational phrases interact scopally with epithets? Moreover, which non-referentialist account is best? Are there even grounds for thinking that a unified account is possible?

It would be also interesting to study what are the criteria of individuating expressions such as complex demonstratives. Why do philosophers tend to give pride of place to several semantic considerations, rather than thinking of the syntactic properties as being constitutive to what an expression is? Is it even possible to individuate expressions in a systematic and non-arbitrary way?

## 7 | CONCLUSIONS

In this thesis I discuss a host of specific linguistic phenomena, and formulate several hypotheses that, albeit theoretically promising according to the desiderata I proposed, are yet to be probed empirically. An important advantage of these accounts is that they are comparatively more promising than their competitors. Let me briefly summarise the arguments of each chapter.

In chapter 1, I discuss the strong economy principle according to which strong inverse scopes—inverse scopes that asymmetrically entail the surface scopes—are disallowed and therefore syntactically ill-formed. I point out that strong economy theorists have assumed, problematically, that upward entailing determiners such as *every* trigger existence presuppositions, whilst downward entailing determiners such as *few* do not. I then go on and present a number of counterexamples to strong economy, based, among other things, on phenomena such as antecedent contained deletion and comparatives (see below for a further illustration of the problems). These problems show strong economy to be, if not downright false, at least a very restricted phenomenon, trumped by many other principles and conditions on scope. This principle's narrow domain of applicability suggests that there should be better alternatives. Perhaps another explanatory strategy is possible, according to which the counterexamples to strong economy are simply possibilities allowed by a more general principle of economy. I propose such a principle in chapter 2. There I argue that Scope Admissibility (and further auxiliary assumptions) regulate the salience of scopal readings. This account allows for the many possibilities that strong economy wrongly predicted to be disallowed. It also recovers the good predictions of the original Scope Economy principles. Moreover, the account seems promising in terms of its implications for the role of contradictions in grammar. In particular, I suggest that there are data showing that inconsistent scopes are, in a sense, more salient than consistent ones.

In chapter 3, I turn to the topic of binding and show that extensions of the standard binding economy principles to new domains—the purported economy effects in constructions consisting of *de se* pronouns, and in specificational copular sentences—have two shortcomings. One shortcoming is that they fail to provide some pragmatic motivation for positing economy principles. The truth-conditions of the competing logical forms should have an effect on the result of the selection of the winner. Otherwise, we have no hard evidence that

the competition exists in the first place. A more general shortcoming is that the type of reasoning behind the binding economy principles would overgenerate if it were applied to other constructions. More specifically, I found fault with the counterfactual implicit in the binding economy principle, namely, the assumption that a logical form which determines a truth-conditionally novel content should be allowed only if other grammatical means couldn't be used to obtain that result. I point out that there are other grammatical operations that satisfy this type of counterfactual, and still we wouldn't want to posit an economy computation for each. To vindicate the binding economy principles, we need to invoke their modularity or their role as 'repair strategies'. This, I argued, produces the reverse problem of having a too restricted or narrow principle. I conclude that the standard economy principles, though initially supported by some very sophisticated predictions, have become explanatorily marginal, and that this suggests that they do not offer a good description of binding patterns. A more general and better pragmatically motivated framework is needed.

Drawing on an existing account, in chapter 4 I develop an improved framework, namely, the *semantic denotational economy* account. This account makes use of a principle of economy, Non-Redundancy, and several auxiliary assumptions about the notion of antecedence and the semantic values of noun phrases (which are taken to be guises). I show how these assumptions can be used to account for a host of economy effects by going through examples that manifest 'obviation' of the three binding conditions (A, B, and C). I then return to the cases that were found problematic in the previous chapter—*de se* pronouns and copular sentences—and argue that a deflationary solution (which makes the most of the denotational economy principle) is to be preferred. I conclude that the denotational economy account is more promising because it gives a more central role to economy principles and is better motivated pragmatically. This is in accord with the two original motivations for economy principles (generality and pragmatism) which are also our desiderata for a good linguistic economy account.

In chapter 5, I argue that the standard economy principles imply that grammar is sensitive to logical properties, and thus support the logic in natural language thesis (LNL). Basically, economy principles are stated under the assumption that mutual entailments between the competing logical forms have to be computed in order to license one of them. I argue that the logicity involved in binding economy (and in other linguistic hypotheses) can be conceived of proof-theoretically or model-theoretically. Some standard objections to the LNL thesis—e.g., the argument from absolute semantics and a version of the argument from idealisation—cannot even get off the ground if we understand logicity in a proof-theoretic way. I then go through several im-

portant objections in order to defend the model-theoretic (or semantic) view of logicity in natural language. In particular, I argue that the central objection to the LNL thesis, the argument from absolute semantics, sacrifices empirical content by making highly restrictive assumptions about the resources available to semantics—resources that do not allow us to define logical properties. I also show that the arguments from lexical semantics, logical constants, and abstraction and idealisation remain inconclusive in the absence of stronger assumptions about language (such as ‘absolute semantics’). I conclude that the standard economy principles, but also the proposed restatements of the economy principles, lend support to LNL, and that it is both empirically and conceptually desirable to keep certain logical properties in the grammar, rather than to push them in non-linguistic realms.

In chapter 6, I exploit one of the essential auxiliary assumptions of the binding economy accounts, namely the assumption that the binding principles should be stated in terms of guises. This entails that, from an economy perspective, complex demonstratives (but also other noun phrases) are not directly referential. This is basically the argument in the second part of the chapter. In the first part of the chapter, I grant the referentialist (the theorist that advocates the direct referentiality of complex demonstratives) that definite descriptions are quantificational. The referentialist’s argument, viz. the argument from scope, purports to show that there are important dissimilarities between the scopal behaviour of complex demonstratives and definite descriptions—where the latter are, crucially, deemed to be quantificational. According to the argument from scope, these dissimilarities show that complex demonstratives cannot be quantificational. I demonstrate that the argument from scope does not go through by examining a number of (what I assume to be) scopal constructions, and find that the differences between complex demonstratives and definite descriptions are minimal. A sizeable part of these constructions involves configurations that test scope possibilities under the assumption that the standard Scope Economy principle and the Parallelism principle (governing VP-ellipsis) are correct, and thus can be used to detect scope. This counter-argument coupled with the argument in the second part of the chapter and with some methodological assumptions (about generality and simplicity of the semantics of noun phrases) made me take the non-referentialists’ side with respect to the semantics of complex demonstratives. (I suggested that the moral is generalisable to other definites and proper names.)

In light of the hypotheses defended in the thesis, I would like now to take a broader perspective and elaborate on the general outlook of my proposals, pointing at the parts of the thesis supporting the general views laid out here. In essence, I am asking: What would



binding and scope phenomena be like, were my proposals true, at least to some reasonable extent?

To begin with, on the view advertised in the thesis, the binding theory would be sensitive to a richer semantic ontology consisting of all sorts of intensional objects (roughly, possible, rather than merely actual, objects). These objects will primarily (but not exclusively) serve as the meanings of noun phrases, (such as pronouns: *she*; definites: *the man in black*, *that man in black* and proper names: *George*). One condition on the use of these objects is that they have some intuitive, pragmatic motivation (rather than some abstract and theoretical uneconomical one). I called these intensional objects *guises*. (I defend the significance of guises in chapters 4 and especially 6.) The semantics will be populated by individual guises, the semantic values of noun phrases. Individual guises are semantic objects that take the form of functions from worlds (or situations) to individual objects, provided that the individual objects satisfy certain descriptive conditions. For instance, in case Mary utters the sentence *She is smart*, having in mind a person with whom Mary talks on the phone, the meaning of the pronoun *she* will be the contextually given guise akin to the denotation of the definite description *the person Mary is talking on the phone with*, assuming that the only potential individuals that can satisfy the description are women. If Mary were to utter, in the same context, *She is Mary*, two distinct guises would be identified. Likewise, if Mary uttered *She likes her*, whatever the guise for *her* denotes, it will be assumed to be a different guise than the guise which gives the meaning of *she*, in conformity to the traditional binding theory. The guise-valued semantics of noun phrases matches very closely the requirements of the syntactic theories, in particular, the principles of traditional binding theory. Even better, it can be adapted to cases that were problematic for traditional binding theory.

To illustrate the capabilities of this enriched ontology by appeal to a new type of guise, consider again Mary uttering, in the context of a logic lesson, *If everyone adulates Kirstin, she<sub>i</sub> totally adulates her<sub>i</sub>*. As several theorists remarked, we can get away with this sort of apparent violation of the traditional binding theory because there is a nuance in the meaning conveyed by this utterance. A more correct utterance, according to the binding theory, would be *she totally adulates herself*, but because Mary can convey a significantly different message by saying *she adulates her*, the binding theory can be overridden. The new type of guise that can represent the significant distinction between adulating someone (as expressed in Mary's actual utterance) and self-adulating (as the traditional binding theory would have it) is called a *complex guise*. Mary gets away with the utterance in question because it expresses a different guise than the one that would have been expressed using the reflexive *herself*. The complex guise akin to the meaning of *love someone* allows Mary to say (or assume) that

many other people, indeed everyone, is given under the same guise. This would not be possible by expressing the guise for *loving oneself* (or *self-loving*), because Mary does not want to say (or assume) that everybody loves themselves.

As I argued in chapter 4, the semantics/pragmatics of guise-valued noun phrases is quite rich. Thus, there are further applications of guises: e.g. special guises and individual similarity-based guises. Let us start with the former. Special individual guises are mixtures of two individuals, and result from an asserted identity statement. Suppose Mary utters that she dreamt that she was Brigitte Bardot. It is perfectly possible to form, in the context of such an identification, a guise that combines some essential traits of Mary and Brigitte. If after making the identification between Mary and Brigitte, Mary goes on and says *I was hiding from me*, we should be able to interpret the first person pronoun *I* as expressing the special guise akin to the denotation of the ‘compound’ description *the Mary-Brigitte*, and the pronoun *me* as referring to a different guise, say the guise for *Mary* or *Brigitte* (depending on the context). This is in accord with the reasoning in the previous paragraph: binding theory would require a reflexive in order to refer to the same individual, but given that on this occasion *me* does not exactly refer to the same person, we can get away with an utterance *I was hiding from me*, because the meaning conveyed is *significantly distinct*.

As for similarity-based guises, they are useful in situations in which Mary is talking about a different object as if that object was Mary herself. These situations are easy to construct by thinking of copies or artistic representations of a person. Thus, if Mary is looking at a picture of herself, or perhaps a statue representing her, we could report the scene by saying *Mary is looking at herself*, although what she is actually looking at is a representation of herself (in some medium, e.g. paper or wax). The physical situation is pretty straightforward, at least in common sensical (if not semantic) terms. But how should we incorporate the utterance of *Mary is looking at herself* in binding theory, which requires that the denotations of *Mary* and *herself* be the same? The answer is that the common denotation of the two noun phrases is a Mary-like guise, a function that yields in (two parts of) the context of utterance two distinct individuals who share some physical similarities.

The thesis that complex demonstratives denote guises (argued for in chapter 5) falls out from this assumption about the semantic ontology, and is supported by the overall plausibility of the thesis.

My aim in positing guises is ultimately to be able to state conditions on their behaviour that are comparable with (if not better than) the traditional binding theory. Accordingly, guises should behave in a regular fashion, according to some general linguistic principles. As we utter sentences consisting of noun phrases, we (as competent

linguistic agents) order the denotations of noun phrases on a line, a sequence of guises. Take any two noun phrases in an utterance. Their denotations is either the same or different. The competent speakers (and hearers) can interpret two noun phrases in a sentence as having either the same referent or disjoint referents.

According to the denotational economy account (defended in chapter 4), one basic principle is followed by competent speakers in deciding the coreference or disjointness (i.e., the property of having distinct referents) of noun phrases. An independently plausible assumption about the ranking of noun phrases according to their dependency potential, or specificity, is needed in order to complement the economy principle. This ranking requires that certain noun phrases introduce new referents, and that yet other noun phrases do not introduce new referents but rather use the referents introduced by the former type of noun phrases. The former type of noun phrases are less referentially dependent (more specific or concrete), whilst the latter type are more referentially dependent (less specific). For instance, intuitively, proper names and definite descriptions are less dependent as to their denotation on other referents (guises) in the sequence, but pronouns are more dependent. Reflexives are the most dependent, and they must use a previously introduced guise. The principle A of the traditional binding theory requires reflexives always to be bound. In terms of sequences, we say that reflexives, while processed, must pull out their semantic values (guises) in a position at the end of a sequence. On the other hand, proper names and definite descriptions must introduce their own semantic values. Consequently, if they introduce a value that is already present in the sequence, the sentence ends up being ungrammatical. This is the case, e.g., with *He saw John*, assuming that the pronoun and proper name receive the same interpretation.

Hence, the picture is that the denotational economy principle (Non-Redundancy) regulates the use of guises in the sequences of evaluation constructed for sentences. The economy principles impose constraints on when an expression can introduce a guise or recycle an already existing one. The economy requirement on sequences of guises leads to the emergence of the binding patterns realised by natural language constructions. Because on the current view guises are semantic values, the account of binding is semantic. Further, because these guises are sometimes given pragmatically, the account of binding is also pragmatic, in the sense that its raw materials, the guises, are formed pragmatically. The principle of economy resembles principles that are deemed to be pragmatic (communication-oriented). Non-Redundancy requires the more (referentially) dependent noun phrases to recycle guises and thus resembles the pragmatic principle requiring economy of expression (keeping the truth-conditional content fixed). On the other hand, if the less (referentially) dependent noun phrases are to realise their potential of referring by themselves,

they should introduce their own guises, which, again, should be non-redundant. Therefore, the principle of economy has a similar flavour as the maxim of manner: (i) it pressures speakers into using the most economical forms of expression (i.e., forms of expressions whose semantic values can be parasitic on the semantic values of other expressions), and (ii) prevents them from using special or overly-specific forms unless they convey novel messages. The first aspect of the denotational economy principle covers uses of pronouns and reflexives (viz. the domain of binding principles A and B), and the second handles proper names, definites, and demonstratives (i.e., the noun phrases in the domain of binding principle C). See Levinson (2000).

I consider this similarity between denotational economy and more familiar pragmatic principles an advantage, because it guarantees, at least at the outset, that we do not posit extraneous structure or computation to deal with binding. (In fact, the basic criticism I levelled against the standard interface principles of economy in chapter 4 was that they appeared to introduce structure (and computations) that are not needed. Even if they succeed to make correct predictions, from a design perspective they do not make sense. If we were to design a perfect grammatical system, whereby the different modules of grammar cooperate well with each other, using interface principles of economy would be bad design, because they involve difficult solutions to problems we need not have.) More generally, I have suggested that pragmatic constraints can put a check on linguistic accounts, preventing them from positing computations which are burdensome, ineffective, and explanatorily marginal. Hence, the similarity between the semantic economy principles and pragmatic principles reflects better the purported elegance of grammar—one of the overarching motivations for positing economy principles. By endorsing the denotational economy view, we have a semantic theory that mirrors the structural features of pragmatics, because there is a clear analogy between the economy principles of the denotational view and the pragmatic principles, such as we know them.

It is worth pointing out that the principle of binding economy is *local*, in the sense that it involves comparisons between sub-sentential structure, rather than between entire logical forms. I have proposed a rather different account of scope, one that relies on considering the properties of a number of logical forms. However, as we shall see shortly, the computation based on these logical forms is semantically restricted. I now turn to presenting the scope-phenomena, according to the controversy-based account.

Scope is a broad phenomenon, very difficult to capture by overarching generalisations. However, as some theorists have suggested, a potentially interesting hypothesis is that the semantic strength of a scopal reading of a given sentence has an effect on the grammatical availability of that scopal reading. I have shown this hypothesis to be

problematic. On the face of it, *Everyone admires someone* has a stronger inverse scope reading (saying that there is a person that everyone admires). Many other counter-examples have been documented in chapter 1. I concluded there that the idea that stronger scopes are disallowed by grammar seems theoretically weak and unsustainable.

In chapter 2 I put forward a similar thesis which has it that any sentence that can produce an inconsistency after disambiguation and consideration of scalar implicatures (inferences from 'some' to 'not all', and the like) is, in some sense, interesting, and its scopal readings are clearer, more salient or easier to get. Two questions arise in connection to the way the saliency of scopal readings has just been presented. Why are disambiguation and implicatures so important, and what does it mean for a sentence to have a clear or less clear scopal reading?

First, why focus on disambiguation and scalar implicatures? Scalar implicatures are strength-based inferences that do not depend on much more than the expressions (in particular, the functional items) in the sentence. Likewise, for a sentence to be endowed with structural ambiguity, we do not have to consider information outside the sentence itself. (Of course, some scalar inferences can be cancelled if we have additional contextual information, and, similarly, sentences can be disambiguated given the pragmatically available information, but both the scalar inferences and the disambiguation are triggered by semantic/pragmatic properties inherent to the sentence.) So it is plausible to think of an utterance as generating a logical space—viz. a space of possibilities whose partitions or divisions mirror the relations between the disambiguated logical forms and their implicatures. The logical space of a sentence is supplied by (what I have called in chapter 4) the *implicature set* of the sentence consisting of the scopal readings of the sentence and their implicatures. The implicature set of a sentence is generated by a mechanism that is essentially based on the semantics of the functional expressions that make up the sentence.

The rationale for constructing a sentence's logical space is the following. Imagine a controversy oriented conversationalist who is also a competent speaker of a natural language. Let us call this person a 'controversationalist'. A controversationalist will be presumably interested in sentences whose logical space is partitioned in such a way that one cannot be in two of its partitions at the same time. In this way, this mythical character ensures that by interpreting a sentence, one will be put in a situation similar to that of choosing between two sides in a debate—in effect, it is as if one would find herself in the middle of a linguistic controversy. In other words, the controversationalist wants a logical space with inconsistencies. Following the logic of controversy, the more inconsistencies in the logical space the better. The worse that can happen, from our character's point of

view, is that no inconsistency appears. Also, the clearer the inconsistencies, the happier the controversialist. In less mythical terms, these inconsistencies determine, in turn, more (or less) salient scopal readings.

I called the ensuing account of scope grounded in the notion of inconsistency the *controversy-based* account. I think of this account as being a linguistic economy account, because it involves forming sets of propositions in order to license the grammatical property (e.g. scope-salience) of a linguistic construction for which that set was constructed.

It turns out that we cannot obtain more than one inconsistency out of the logical space formed from the disambiguated logical forms of a given sentence and their scalar implicatures. What we can get, though, is a more (or less) clear inconsistency in the logical space generated by a sentence. This brings us to the second question: What does it mean to say that a scopal reading is more salient than another?

I left the meaning of salience of an interpretation (or scopal reading) at an intuitive level, meaning something akin to the clarity of the interpretation or the easiness to grasp that interpretation. To make the notion more precise, we need to distinguish between two related meanings of salience. A scopal reading of a sentence *s* may be salient relative to another scopal reading of the *same* sentence *s*. A scopal reading of a sentence *s* may be salient relative to the corresponding scopal reading of a *different*, but structurally similar, sentence *q*. Accordingly, there are two axes along which we can compare saliency. One is across sentences (intra-sentential), and the other is within sentences (extra-sentential).

Along the extra-sentential axis, a scopal reading is more clear or salient than another just in case it belongs to a sentence which generates a logical space with a simpler partitioning that, moreover, allows for a contradiction (or an empty intersection between partitions). That is, provided that there is a contradiction, the less partitions there are in the logical space of a sentence, the more salient the scopal readings of that sentence will be. The extra-sentential salience is thus a matter of the simplest (disjoint) partitioning. In other words, the inverse scope of a sentence is more salient than the inverse scope of another in case the former sentence derives more 'quickly' a contradiction.

As far as intra-sentential comparisons of salience are concerned, the scopal reading that is *essential* for producing the contradiction receives a special saliency status. Most of the time, it takes two readings to get a contradiction, which makes these readings equally salient from the perspective of the controversy-based mechanism. (Note that there are further factors affecting scope-saliency, such as the left-to-right parsing direction, and various other pragmatic factors.) But there are special cases where we get a reading which is itself a contra-



diction. There is at least one type of linguistic construction capable of producing contradictory scopal readings. (We shall see some examples shortly.) In fact, these contradictory scopal readings will be salient both intra-sententially and extra-sententially.

According to the controversy based account, the (extra-sentential) saliency of scope shows a certain gradability. At one end of the spectrum, there are, as it were, ‘infinitely’ non-salient scopes, generated by sentences that can produce no contradiction. At the other end, there are sentences with very salient inverse scopes. (These are the sentences which generate a contradictory scopal reading—see below.) In between there is a vague terrain, where no saliency distinctions are noticeable (see chapter 4 for examples).

This picture can be interpreted in a broadly Gricean fashion. Of course, you may say, contradictions are interesting in the sense of the controversy-based account only because the potential to generate a contradiction is, logically speaking, the same thing as the potential of generating truth-conditionally distinct scopal readings. And a sentence’s being ambiguous between two truth-conditionally distinct scopal readings has an important pragmatic function, since it allows us to convey different messages relative to different contexts of utterance using the very same sentence. So, if ambiguous sentences have some pragmatic import, based on the different truth-conditional contents that they can express, and truth-conditionally different disambiguated logical forms are all we need in order to generate an inconsistent implicature set, then, the argument goes, the controversy-based account follows from more basic facts about communication. However, this reasoning disregards an important dissimilarity between the apparent motivations of the Gricean and controversy-based accounts. The crucial point of dissimilarity follows from the fact that contradictory scopes are more salient than contingent ones.

To see this, consider the sentences with an inconsistent scopal reading announced earlier. Compare the sentence *John wants to be taller than himself* with *John wants to be taller than Sue*. These sentences are structurally ambiguous between two readings. On one reading (reading 1), John wants to be taller than a person (namely, John himself or Sally) is at the actual world; he wants his degree of tallness to be higher than another person’s actual degree of tallness. On the other reading (reading 2), John wants to be taller than a person whatever his/her height is, or (equivalently) whatever height that person happens to measure at some possible world. Now, note that on reading 2, the former sentence (which utilises a reflexive) is much more salient than the other sentence (utilising a proper name). It seems to me that this difference in saliency is clear in the phenomenology of interpreting the two comparative sentences. This is because, I hypothesise, contradictions are, in some sense, appealing. The sense in which they



are appealing is, roughly speaking, the sense in which they serve the controversialist introduced earlier.

There are many other constructions involving comparatives that have the property of generating a contradiction on one of their disambiguating logical forms. All of these contradictory logical forms are, on reflection, more salient than other parallel logical forms that are not contradictory. Crucially, this saliency-contrast cannot be fully explained in Gricean terms, because the saliency of a contradiction cannot, in general, be the expression of cooperative communication. Quite to the contrary: the contradictions above do not seem to play a role in communication. So one reason to think that this is a controversy-gearred phenomenon is the very existence of salient contradictions. Of course, this does not exclude the possibility that this mechanism indirectly serves a broadly Gricean picture of communication, but, taken at face value, its primary motivation is quite different.

Inconsistency and its cognates (e.g. contradiction, incompatibility) are basic notions used to define many other notions.<sup>1</sup> Thus, we say, for instance, that a conditional (or perhaps a causal) claim having the form  $p \rightarrow q$  is true just in case it is not the case that  $p$  and  $q$  are inconsistent (i.e., it is not the case that  $p$  can be true and  $q$  false). Moreover, judging from our cognitive lives, we do have very basic intuitions about what is inconsistent/incompatible with what. We may have a notion of inconsistency/incompatibility that is more general than, or just different from, the logical one, as we find, for instance, in the remark that raining is incompatible with the streets being dry. Further, inconsistencies are defects in our arguments, so it makes sense to be more sensitive to them rather than to other logical properties. Given the broad cognitive significance of this notion (cf. Brandom 2008), it is not implausible to think that the notion of inconsistency plays a central role in the semantics and pragmatics of natural language.

How does the controversy-based account fare with other views currently on the market? One advantage of having a controversy-based account of scope saliency is that we cover all the cases covered by the original Scope Economy principle. But it becomes immediately clear by examining the relevant data that further syntactic, semantic, and pragmatic constraints on scope are needed in order to complement the controversy-based account.

From the perspective of current research in linguistics, the controversy-based account completes an emerging picture about the role of logic in grammar. This emerging picture lends support to the thesis that grammar is sensitive to logic. There are several ways to show this, and one argument that I put forward in favour of the thesis (corroborated by many other arguments) is from principles of economy.

<sup>1</sup> To be more precise, what we need, strictly speaking, is the notion of inconsistency that disallows two propositions to be true at the same time, but allows them to be false at the same time.

Before showing how the controversy-based account fits in this picture, let us pause to sketch the argument from economy (developed in chapter 5).

My claim is that standard principles of economy involve logicity. Recall that in order to allow an inverse scopal reading of a sentence, Scope Economy has to check whether that reading is different from (or non-equivalent to) the surface scope reading. Given that all lexical material is put aside, and only the structural properties of the scopal readings are relevant for the ‘economy’ computation, the process of checking the non-equivalence of two logical forms is a process of checking the *logical* non-equivalence of those logical forms.

A similar argument can be run from the Binding Economy principle (see §5.2.2). A given expression within a sentence that seems to violate a binding principle is allowed just in case that expression makes a contribution to the logical form of the sentence, a contribution which is logically distinct from the contribution made by another competing expression (that is in accord with the binding principle). In other words, if the guises introduced by the expressions that seem to disregard binding theory are different from the guises introduced by the expressions that are in accord with it (and if the former guises are pragmatically useful), they are allowed, and binding theory is obviated. Since distinctions between guises are a matter of how the guises behave across possible worlds, and that all the lexical items in the sentence are removed for the purposes of the economy computation, the distinction between the resulting logical forms is a matter of determining whether a given equivalence holds across possible worlds (i.e., in a space of models that serve to interpret the equivalence in question). So distinguishing between logical forms involves checking whether a given equivalence is valid, or whether a certain type of logical consequence relation is in place between two logical forms.<sup>2</sup>

Now, the thesis that grammar is sensitive to logic has many other advocates, whose arguments are based on a wide range of linguistic evidence. One important strand of research seeks to explain ungrammatical sentences by their contradictoriness (Chierchia 2013). But not every kind of contradictoriness generates ungrammatical constructions, since, for instance, *It's raining and it's not raining* or *He is taller than himself* are perfectly grammatical, albeit contradictory. The needed contradictoriness must be insensitive to the identity of lexical items, that is, the contradictoriness should occur even if the lexical items were substituted *non-uniformly*. Gennaro Chierchia distinguishes this notion of contradiction, viz. *G-contradiction*, from the standard notion of contradiction, viz. *L-contradiction*. Accord-

<sup>2</sup> Validity or logical consequence can be defined not only in the suggested semantic terms—as truth-preservation across possible worlds,—but also syntactically, as derivability from a set of axiom by way of rules of inference.

ing to the former, e.g., *It is raining and it is not raining* is not a (G-)contradiction, since, if we substitute lexical items in a non-uniform fashion in that sentence, we can get potentially true statements, e.g. *It is snowing and it is not raining*. (According to the more standard L-contradiction conception, the sentence *It is raining and it is not raining* is surely contradictory.) But if the role of G-contradictions is to generate ungrammatical sentences, what is the role of L-contradictions?

L-contradictions may well have no role, since we know that asserting or assuming contradictions leads to ineffective communication. However, my claim, based on the controversy-based account, is that the L-contradictions—or simply contradictions—have a *positive* role. The positive role of L-contradictions is to make logical forms (more or less) salient, rather than to disallow logical forms (the negative task of G-contradictions). On the controversy-based account, the linguistic constructions that have the potential of generating contradictions are more attractive than those that do not. So the controversy-based account put together with the accounts based on G-contradictions plead for a division of labour in the grammatical role of contradictions: there are good contradictions and bad ones. The G-contradictoriness accounts, the controversy-based account, as well as the standard economy-based accounts, bring significant and intriguing support for the general thesis that grammar is sensitive to logic.

An important consequence of the present dissertation is to broaden the notion of economy. Linguistic economy can be seen as an interface feature of grammar, a mechanism that regulates the interface between syntax and semantics, or, as I proposed, a semantic/pragmatic feature. In putting forward the denotational economy account and the controversy-based account, I argued for a semantic/pragmatic view of linguistic economy, on the grounds that these views are better motivated pragmatically and more general. (In chapters 1 and 3, I have shown that the pragmatic and generality desiderata are not met by the standard, interface accounts.) But there is some feature of the interface economy explanation that is preserved under semantic/pragmatic accounts, namely that in order to establish whether a given linguistic construction is grammatical, other constructions should be considered. This feature is present in my accounts as well as in many other accounts, especially in those making use of logical properties in order to explain ungrammaticality.

These general observations suggest that thinking about the varieties of linguistic economy has a rich and insightful impact on our current understanding of language and grammar. Linguistic economy has consequences on how we conceive of the meaning of noun phrases (pronouns, definites etc.), on the structural properties of linguistic constructions (e.g. logicity), and on how we think of the general principles governing scope and binding. As far as the key

hypotheses presented here are concerned (the controversy-based account and denotational economy), I think that there are several theoretical guidelines and resources that might help advance our understanding of scope and binding. Regarding scope, we have to look more into the cognitive significance of contradictions, attempting to find other linguistic phenomena in which they may be involved. We might try to exploit for the purposes of linguistic inquiry the apparent tension between the phenomenological saliency of contradictions and their lack of pragmatic/communicative appeal. With respect to binding, a key area that promises to offer some illumination for the present endeavours is the study of the properties of noun phrases (their 'features', presuppositional and assertoric content) that are responsible for their varying appetites for referential dependency.

Part IV

APPENDICES

# A | MONOTONICITY

In presenting the strong principle of economy, we need to rely on logical properties of linguistic operators, and in particular on downward monotonicity. Here, I shall define the possible ‘monotonicities’ of natural language operators and then discuss each in turn.<sup>1</sup> These notions have been assumed in the preceding discussion.

**MONOTONICITIES** Let  $A, B, C$  be the sets corresponding to the semantic values of linguistic predicates, and  $o$  a linguistic operator. Provided that  $A \subseteq B$ , the relations  $R_o$  can have the following properties:

- ( $\nwarrow$ ) **LEFT UPWARD MONOTONE**  $\langle A, C \rangle \in R_o \Rightarrow \langle B, C \rangle \in R_o$
- ( $\swarrow$ ) **LEFT DOWNWARD MONOTONE**  $\langle B, C \rangle \in R_o \Rightarrow \langle A, C \rangle \in R_o$
- ( $\nearrow$ ) **RIGHT UPWARD MONOTONE**  $\langle C, A \rangle \in R_o \Rightarrow \langle C, B \rangle \in R_o$
- ( $\searrow$ ) **RIGHT DOWNWARD MONOTONE**  $\langle C, B \rangle \in R_o \Rightarrow \langle C, A \rangle \in R_o$

For convenience, I shall speak of the semantic values of various natural language predicates as being sets. The types of monotonicity defined above correspond to inference patterns that depend on the semantic relations between sets, the semantics of the relevant operators, and the syntactic distribution of the phrases expressing these sets and operators.<sup>2</sup>

We are talking about operators in the broad sense, including the negation operator and quantificational determiners such as *few*, *some*, *less than three*, *exactly four* and so on. As mentioned, an operator’s monotonicity determines the patterns of entailment of sentences of a specified syntactic and semantic structure containing that operator.

<sup>1</sup> In this appendix, I build on the discussion in Heim and Kratzer (1998, p. 152).

<sup>2</sup> One might wonder what the *upward* and *downward*, *left* and *right* notions have to do with the corresponding definitions. The ‘vertical’ attributes of monotonicity, upward and downward, correspond to the subset and superset relation between the sets  $A$  and  $B$ . For instance, if we start in the right-hand side of a definition that makes use of  $A$  in the antecedent, and we infer something about  $B$  in the consequent, we basically go upward, since, by hypothesis,  $A$  is the subset of  $B$ . The ‘horizontal’ attributes of monotonicity, left and right, refer to the position that  $A$  or  $B$  have relative to  $C$  in the antecedent in (the right-hand side of) each definition. For instance, if the antecedent in the right-hand side of a definition has  $B$  (or  $A$ ) to the right of  $C$ , the monotonicity defined is right monotonicity.

Here are a few examples of entailment, where each time the first sentence (b) is understood to entail the second (b), and the set  $A$  is included in  $B$ .

26. The  $R_{\text{some}}$  supplied by the determiner *some* is left upward entailing ( $\nearrow$ ). (The same can be said about  $R_{\text{some-not}}$  supplied by the phrase *some ... not*.)
  - a) Some [UEA students in room 01.07] $_A$  are [philosophers] $_C$ .
  - b) Some [UEA students] $_B$  are [philosophers] $_C$ .
27. The  $R_{\text{no}}$  supplied by the expression *no* (or *none of*) is left downward monotone ( $\searrow$ ).
  - a) No [UEA student] $_B$  is a [philosopher] $_C$ .
  - b) No [UEA student in room 01.07] $_A$  is a [philosopher] $_C$ .
28. *At least three* and *more than two* (and the underlying  $R_{>2}$ ) are right upward monotone ( $\nearrow$ ).
  - a) At least three/more than two [philosophers] $_C$  are among the [UEA students in room 01.07] $_A$ .
  - b) At least three/more than two [philosophers] $_C$  are among the [UEA students] $_B$ .
29. *Fewer than two* and *less than two* (and the underlying  $R_{<2}$ ) are right downward monotone ( $\searrow$ ).
  - a) Fewer than two [philosophers] $_C$  are among the [UEA students] $_B$ .
  - b) Fewer than two [philosophers] $_C$  are among the [UEA students in room 01.07] $_A$ .

The argument for strong economy relies on the downward monotonicity property of linguistic operators. We should retain two important points from the present discussion of monotonicity. Firstly, the monotonicity property of an operator depends on its position relative to the noun phrases (with the sets  $A$ ,  $B$ , and  $C$  as semantic values), and, more importantly, on their position relative to other operators. The dependence of the monotonicity property of operators on their surrounding configuration falls out of our definitions. Secondly, note that there are linguistic operators that have none of the monotonicity properties listed above. Cases in point are the quantifier phrase *exactly three students* and *more than three but less than five*. For instance, from the fact that exactly three UEA students in room 01.07 have failed, one cannot infer that exactly three UEA students have failed. Nor does the inference in the opposite direction hold. Thus, there are operators that have *no* monotonicity property. These two observations are important because they suggest how to investigate the GSEC hypothesis under all its aspects, a task undertaken



in §1.2.2. The monotonicity properties of an operator determine the relative semantic strengths the operator in question will have under different scopings.

## B | FURTHER COUNTEREXAMPLES TO STRONG ECONOMY

Some of the most notable counterexamples are the following. Universal quantifiers and negation swap places in some cases. These interactions resemble the scopal interactions between indefinite GQPs and negation: the subject GQPs must scope over negation on neutral intonation, and the object GQPs are scopally flexible (type 2a + type 1a). (Beghelli and Stowell 1997, ex. 30a-b, p.28)

30. a) All the boys didn't leave.  $(\forall > \neg), *(\neg > \forall)$   
 b) John didn't read all the books.  $(\forall > \neg), (\neg > \forall)$

Similarly, Heim and Kratzer (1998, p. 137) suggest a further ambiguity, which turns out to be another type 1a counterexample. I adapt slightly their example. Suppose that the utterer is talking about what the weather was like on a short break of 3 days.

31. It didn't snow on more than two days of the (3 day) break.  
 a) max. two days of snowing and at least one non-snowing day  $(\neg > \text{more than two})$   
 b) no snowing day and three non-snowing days. (more than two  $> \neg$ )

So the difference between the two readings is like the difference between asserting that there has been some snowing and asserting that there hasn't been any snowing. The latter assertion is surely stronger, *contra* the principle of strong economy.

von Stechow and Iatridou (2007, p. 464) present the following scopal construction involving negative polarity item (NPI) expressions (e.g., *any, anything*), as well as the judgements on the right-hand side:

32. Mary didn't wear any earrings at every party.  $(\forall > \neg > \text{NPI}),$   
 $(\neg > \text{NPI} > \forall)$

Both relevant readings are allowed. The surface scope reading says that there is no particular earring Mary wore at every party. In contrast, the inverse scope reading says that Mary didn't wear any earrings at any party. The latter reading is stronger. Yet, contrary to strong economy, it seems a perfectly acceptable interpretation—another type 1a counterexample.

33. *Definite descriptions and existential quantifiers in predicative position do not interact scopally with negation* (Brogaard 2007, p. 123)

- a) John is not the owner. \*(the > ¬)
- b) Lisa is not someone you can trust. \*(∃ > ¬)

It is clear that these copular sentences are not saying that there is a unique owner that John is not, and that there is someone you can trust that is not Lisa, respectively. Both of these inverse scope interpretations are weaker than the surface scope interpretations. It is only the surface scope that is available for (33). Thus, the sentences should be read as saying something akin to the following: there is not unique owner who is John, and there is no person you can trust such that that person is Lisa. (A similar behaviour is replicated by indefinites in copular sentences, e.g. *Jane is not a coward.*)

Take  $p$  and  $q$  to stand for the surface and inverse scope readings of a given natural language sentence. These readings are the *in principle* possible logical forms of  $s$ , and should go through the implicature mechanism in order to be endowed with salience. The two readings of the sentence have an internal structure of the form  $O_1O_2$  (surface scope) and  $O_2O_1$  (inverse scope), where  $O_1$  and  $O_2$  are natural language operators (e.g. negation, quantifiers etc.). The propositional variables  $p$  and  $q$  preserve the relevant semantic relations between the scopal readings. In particular, there are several relevant types of relation between the two scopal readings. Arguably, the relation between the scopal readings of the examples surveyed in the present paper, fall into one of the categories below.

1. either  $p \subseteq q$  or  $q \subseteq p$
2.  $p = q$ , where  $p$  and  $q$  are non-empty.<sup>1</sup>
3.  $p \cap q = \emptyset$ , because either  $p = \emptyset$  or  $q = \emptyset$

As far as the notation is concerned, read  $p \subseteq q$  as  $p$  *entails*  $q$ . A proposition  $p$  entails a proposition  $q$  just in case for every possible world  $w$ ,  $q(w) = 1$  if  $p(w) = 1$ . Similarly,  $p \subset q$  reads  $p$  *strictly entails*  $q$ . A logical form  $p$  strictly (or asymmetrically) entails a form  $q$  just in case for every possible world  $w$ ,  $q(w) = 1$  if  $p(w) = 1$ , but the converse does not hold (it is not the case that if  $q(w) = 1$ , then  $p(w) = 1$ ). Further,  $p = \emptyset$  means that  $p$  is self-contradictory, and  $p \cap q = \emptyset$  means that  $p$  and  $q$  are inconsistent.

The *implicature set* of a sentence consists of its scopal interpretations  $p$  and  $q$  and their scalar implicatures. For example, assuming that  $p \subset q$ , the *relevant* scalar implicature of  $q$ ,  $I(q)$ , is  $\bar{p}$ , the complement of  $p$ . Meanwhile,  $p$  does not have any relevant implicature, and, consequently,  $I(p)$  does not belong to the implicature set. In case no implicature  $I(p)$  arises, what gets in the implicature set, and is considered a relevant implicature, is the trivial implicature. That is, the relevant implicature  $I(p)$  is taken to be  $\top$ , the proposition that is true everywhere and thus includes the entire domain of worlds. In this way, we make sure that  $I(p)$  does not affect the inconsistency of the implicature set.

---

<sup>1</sup>  $p = q$  is shorthand for  $p \subseteq q$  and  $q \subseteq p$ .

In general, then, the relevant implicature set of a sentence  $s$  will be  $\mathcal{I}_s = \{p, q, I(p), I(q)\}$ . *Admissible scope* requires that if the implicature set  $\mathcal{I}_s$  of sentence  $s$  is inconsistent, both of  $s$ 's scopes,  $p$  and  $q$ , should be admissible, i.e., (CB-)salient. *Salient* (without further qualification) means that the degree of salience of the sentence  $s$  is positive, but it does not tell us anything about what degree that is or how it compares to the degree of salience of other sentences.<sup>2</sup>

**Definition 1** (Implicature set). *The implicature set of sentence  $s$  is  $\mathcal{I}_s = \{p, q, I(p), I(q)\}$ , where  $p$ ,  $q$ , and  $I(p)$ ,  $I(q)$  are the scopal readings of  $s$  and their relevant scalar implicatures, respectively.*

**Definition 2** (Admissible Scope). *The scopal logical forms  $p$  and  $q$  of sentence  $s$  are admissible (or salient) iff the relevant implicature set  $\mathcal{I}_s$  is inconsistent.*

Note that only  $p$  and  $q$  can give birth to *relevant* implicatures, and thus the relevant scalar implicature can take the form  $\bar{p}$  or  $\bar{q}$ . In other words, even if it is logically possible to find an  $r$ , distinct from  $p$  and  $q$ , that strictly entails or is strictly entailed by  $p$  or  $q$ ,  $r$  will not be part of the computation.

**Definition 3** (Relevant Implicatures and Sets). *A scalar implicature  $I(p)$  (or  $I(q)$ ) of a sentence  $s$  is relevant if it has the form  $\bar{q}$  (or  $\bar{p}$ ), where  $p$  and  $q$  are the scopal logical forms of  $s$ . In case no implicature of this form exists, the relevant implicature is  $\top$ . A relevant implicature set  $\mathcal{I}_s$  consists only of relevant implicatures (and the scopal readings).*

For convenience, we can suppress the adjective *relevant*, since it is clear from the context when an implicature and the resulting implicature set are relevant.

On these assumptions, it is easy to prove that if a sentence has two (scopal) logical forms and one of them strictly entails the other, the sentence has two salient scopal readings. In other words, if  $s$ 's scopal readings  $p$  and  $q$  are related in one of the two ways displayed in (1),  $p$  and  $q$  should be salient interpretations of  $s$ .

**Proposition 4** (Strict entailment). *For any scopal readings  $p$  and  $q$  of a sentence  $s$ , either  $p \subset q$  or  $q \subset p$  holds, then  $s$ 's implicature set  $\mathcal{I}_s$  is inconsistent, and  $p$  and  $q$  are admissible for  $s$ .*

Consider the first case in (1), where the relation between the scopal readings of  $s$  is  $p \subset q$ . Then, the relevant implicature set of a sentence

<sup>2</sup> By asserting  $q$ , given  $p \subset q$ , the message conveyed will not be simply the implicature but rather the implicature subtracted from what  $q$  says, namely,  $C(q) = q - \bar{p}$ , where  $C$  stands for the truth-conditional content conveyed. I won't need to use  $C$ , since the purpose of the computation is not to spell out the content conveyed after introducing the scalar implicature. (But note that the content conveyed is implicit in the implicature set, since it is equivalent to the set of worlds that make true both  $p$  and  $q$ , namely,  $p \cap q$ .)

$s$  will be  $\mathcal{I}_s = \{p, q, I(q), \top\}$ . As  $I(q) = \bar{p}$ , and thus  $I(q) \cap p = \bar{p} \cap p = \emptyset$ , the implicature set  $\mathcal{I}_s$  is inconsistent. By Admissible Scope, both  $p$  and  $q$  are salient.

For parity of reasoning, a symmetrical result will be obtained in case  $q \subset p$ , where  $p$  and  $q$  are the surface and inverse scope readings of the sentence  $s$ . To show this, it is enough to substitute  $p$  for  $q$  in the reasoning above. The implicature set will be  $\mathcal{I}_s = \{p, q, I(p), \top\}$ , an inconsistent set in virtue of the equivalence  $I(p) \cap q = \bar{q} \cap q = \emptyset$ . In virtue of Admissible Scope, both  $p$  and  $q$  are, once more, salient. Hence, Strict Entailment is true.

Consider now what happens in case (2), where the scopal readings of  $s$  are equivalent (but non-empty). In this case, it follows that there is no relevant  $r$ , which strictly entails or is entailed by  $p$  or  $q$ , and which can serve as a basis for a relevant implicature. Thus, the implicature set associated with  $s$  will consist only of  $p$  and  $q$ , which are by definition consistent.

**Proposition 5** (Equivalent Scopes). *If the two scopal readings of a sentence  $s$  are logically equivalent,  $p = q$ , the resulting implicature set  $\mathcal{I}_s$  is consistent, and the scopal readings are not admissible.*

Moreover, case (3) generates admissible scopes, because one of the scopal readings  $p$  and  $q$  is itself inconsistent, which makes the implicature set inconsistent.

**Proposition 6** (Self-Contradictory Scope). *If one of the scopal readings  $p$  and  $q$  is inconsistent (i.e., is the empty set  $\emptyset$ ),  $\mathcal{I}_s$  is inconsistent, and  $p$  and  $q$  are admissible.*

Three further remarks are in order. Firstly, every example discussed in chapters 1 and 2 falls into one of the (1)-(3) categories, and is thus covered by one of the three propositions above. But it is worth pointing out that if there were cases where  $p$  and  $q$  were overlapping, but neither of them strictly entailed the other (namely, cases where  $p \cap q \neq \emptyset$ ), then  $p$  and  $q$  would end up being inadmissible under the current assumptions. Further assumptions would be needed in order to account for them.

Secondly, the admissibility or (positive) saliency is attributed to both  $p$  and  $q$  once we get an inconsistent implicature set. In order to allow for comparisons, we need to distinguish between the saliency of the scopal readings that are admissible. In order to do that, we invoked the intuitive notion of quickness: a scopal reading is more salient than another if it derives more quickly a contradiction in its implicature set. The implicature set and the set theoretic relations between its members establishes a logical space. We can translate the notion of quickness in terms of partitions of the implicature set; the less partitions are needed in order to obtain a contraction, the quicker the derivation of a contradiction is. Case (3) is relevant in this respect.

For the inconsistent reading, say  $q$ , represents a null partition, and the other partition in the logical space established by the implicature set is  $p$ . This is the simplest partitioning that might obtain, since once we see the null set we can be sure that we have obtained a disjoint partitioning, whereas for all the other cases the consideration of further partitions are needed. So we expect that other sentences with more complex partitions will generate less salient scopes. Intra-sententially, the scopal reading that is essential for generating the inconsistency is more salient (everything else being equal). So we expect that a self-contradictory scope, as described in (3), should be, *ceteris paribus*, more salient than the opposed scopal reading. Thus, this suggests that the complexity of the partitioning in the logical space defined by an implicature set is a measure of the gradability of scopal salience.

Finally, in chapter 2 I made use of the notion of secondary implicatures. To introduce this notion, we assume  $p \subset q$  and add another logical form  $r$ , stronger than  $\bar{p}$  (i.e.,  $r \subset \bar{p}$ ). Hence, if such a logical form  $r$  exists, the implicature set will have an additional member,  $I(I(q)) = I(\bar{p}) = \bar{r}$  (namely, the secondary implicature of  $q$ ). Then, all it remains to be done is to define Scope Admissibility in terms of the enlarged implicature sets.



# D | THE CB ACCOUNT: FURTHER APPLICATIONS AND SUMMARY

The following table summarises the data considered in chapter 2 and the ones given below. Each row in the table contains the relevant forms that enter the implicature set of the scopal reading to be tested for admissibility. In the inverse scope implicatures (IS-implicatures) and surface scope implicatures (SS-implicatures) columns, I use a bar | to separate the primary and secondary implicatures (if any). As for the other notational conventions, the negation, standard quantifiers, and intensional operators are represented as usual; M and F mean *many* and *few* respectively,  $\exists_2$  means exactly two. For the numerical cases,  $<$ ,  $>$  have the standard meaning: less than and greater than. Further, I used  $m/3$  to mean  $m$  objects out of 3, and, similarly,  $(0 - n)/7$  will be used to say that between 0 and  $n$  objects out of 7 have the relevant property. I emphasise in grey the forms that give rise to contradictions.

Surface Scope (SS)	SS-Implicatures	Inverse Scope (SS)	IS-Implicatures
$\exists\exists$	$\neg\forall\exists, \exists\neg\forall \mid \exists\exists, \exists\forall$	$\exists\exists$	—
$\exists\forall$	$\neg\forall\forall = \exists\neg\forall \mid \exists\forall$	$\exists\forall$	$\forall\exists\neg$
$\forall\exists$	$\forall\exists\neg \mid \neg$	$\forall\exists$	$\neg\forall\forall \mid \exists\forall$
$\forall\forall$	—	$\forall\forall$	—
$\forall\neg = \neg\exists$	—	$\forall\neg = \neg\exists$	$\exists$
$\neg\forall = \exists\neg$	$\exists$	$\forall\neg = \neg\exists$	—
$F\forall$	$M\neg\forall, \exists\exists$	$\forall F$	$\forall\neg M, \neg F\forall$
$M\exists$	$M\neg\forall, \neg\forall\exists$	$\exists M$	$\neg\forall M \mid \forall F$
$M\forall$	$\neg\forall\forall$	$\forall M$	$\forall\neg\forall, \neg M\forall$
$\exists F$	—	$F\exists$	$\neg\exists F, \neg M\exists$
$\Diamond(c < c) \Rightarrow \perp$	—	—	—
$\Box(c < c) \Rightarrow \perp$	—	—	—
$\neg >_2 = (0 - 2)/7$	—	—	$>_2 \neg = (0 - 4)/7$
$\neg\exists_2$	$(0 - 2)/5$	$\exists_2\neg$	$3/5$
$\text{most} > 3 \Rightarrow > 3$	—	$3 > \text{most} \Rightarrow 3$	—
$\forall\exists_3 \Rightarrow > 3$	—	$\exists_3\forall \Rightarrow 3$	—

**Table 1.:** The rows that give rise to contradictions between the items in grey contain admissible inverse scopes. According to the controversy-based account, all other things being equal, the quicker the contradiction occurs, the more salient the inverse scope is.

Recall that, where such contradictions appear, the relevant surface and inverse scope are grammatically available (admissible or salient), even if not pragmatically salient. Except for the  $\exists\exists$  and  $\forall\forall$  rows, all the other rows contain scopes that are admissible by Scope Admissibility. The surface and inverse scopes of these constructions are

truth-conditionally identical, so no implicature will produce inconsistencies (see previous appendix). Under our hypothesis, among the admissible scopes, the surface ones are generally more salient in neutral contexts, but there is also opposing pressure towards making the inverse scopes more salient *via* Gradability.

I hinted (in fn. 6) that the cases below, in which, according to Miyagawa (2011), negation seems to block reconstruction, support the strong economy account. The judgements represented on the right hand side are not mine. To anticipate, I shall predict that both scopal readings are in fact possible for the two constructions. This runs counter to Miyagawa's judgement about (4).

4. a) Some student or other has answered many of the questions on the exam.  
(many >  $\exists$ )
  - surface scope: some student answered many questions  
 $\exists > \text{many}$
  - surface scope implicature: all students answered some (/few) questions  
 $\forall > \exists$  or  $\forall > F$
  - inverse scope: many questions were answered by some student  
 $\text{many} > \exists$
  - inverse scope implicature: not all questions were answered by some student  
 $\neg \forall > \exists$
  - *contradiction* from scope implicature and inverse scope implicature  
 $\perp$
- b) Some student or other has answered few (of the) questions on the exam. (both)
  - surface scope: some student answered few questions  
 $\exists > F$
  - surface scope implicature: none of interest
  - inverse scope: few questions were answered by some student  
 $F > \exists$
  - inverse scope implicature: no single students answered these few questions  
 $\neg \exists > F$
  - *contradiction*, since surface scope and inverse scope implicatures are incompatible  
 $\perp$
5. I have not met some student.  $*(\neg > \exists)$
6. Some student or other hasn't answered many of the questions on the exam.  $*(\neg > \exists)$

The constructions (4a)-(4b) have inconsistent implicature sets. Therefore, the constructions should be scopally flexible.

The construction (5) is a special case due to the at least apparent impossibility of surface scope. If this were the case, the problem generated wouldn't be unique to GSEC, but also to SE. In any event, I tentatively handle (5) in the same manner.

7. I have not met some student.

- surface scope: I have not met any student ( $\neg > \exists$ )
- surface scope implicature: none
- inverse scope: there is a student I have not met ( $\exists > \neg$ )
- inverse scope implicature: there are some students I have met
- *contradiction*: between surface scope and inverse scope implicature

On our view, the contradiction leads to the moderate accessibility of the inverse scope.

On several theorists' judgement, the construction (6) has no inverse scope interpretation. Let's see if we can obtain this result by way of the consistency test.

8. Some student or other hasn't answered many of the questions on the exam.

- surface scope: some student has not answered many questions ( $\exists > \neg$ )
- surface scope implicature: some student answered many questions
- inverse scope: no student answered many questions ( $\neg > \exists$ )
- *contradiction*: between surface scope implicature and inverse scope.

Since a contradiction is generated, our prediction does not accord with the judgements expressed in (6). On our broader view of scope, both scopal readings are possible.

I noted (in fn. 6) that some of the data presented by Beghelli and Stowell (1997), repeated here as (9)–(10), are also supporting the strong economy principle. As before, I try to handle them using an inference that connects implicatures with scope possibilities. I am assuming that we lack contextual information about the total number of books.

9. Indefinites or bare numerals under negation.

- a) The students didn't read some books.
- b) The students didn't read two books.

- surface scope: the students did not read 2 books  $\neg > \exists_2$
  - surface scope implicature: at most one book was read  $1 \vee 0$
  - inverse scope: two books were not read  $\exists_2 > \neg$
  - inverse scope implicature:  $\exists x$  unread book  $x$
  - *no contradiction*, since all the assumptions are compatible
- c) No student read some books.
- d) No student read two books.
- *no contradiction* (for *two books*, the computation is the same as the above)
10. QPs always take scope above negation in the absence of marked intonation.
- a) Some students didn't read this book.
- b) Two students didn't read this book.
- surface scope: 2 students didn't read this book  $\exists_2 > \neg$
  - surface scope implicature:  $\exists x$  student who read this book  $x$
  - inverse scope: it's not the case that two students read this book  $\neg > \exists_2$
  - inverse scope implicature: at most one student read this book  $1 \vee 0$
  - *no contradiction*
- c) Some students read no books.
- d) Two students read no books.
- *no contradiction* (for *two students*, same as the computation above)

For the bare numeral quantifiers, I listed the computations above. It should be remarked that although no contradiction ensues in contexts with imperfect information (as the ones above), contradictions can be generated when we get more specific information. Because such contradictions are possible, but hard to obtain, I in fact predict that the pragmatic scope of such constructions is indeterminate. I focus next on the versions using the quantifying determiner *some*. Since its inverse scope implicature is not consistent with the surface scope reading, I again predict moderate availability.

Turning to the cases in (10), it is an easy exercise to show that we obtain a contradiction, and thus, on my account, the construction has an inverse scope reading which, moreover, is moderately salient.

Further examples involving numerals are given below:

11. a) At least three/more than two [UEA students] are never/not [prepared for the exam]. ( $\nearrow$ )
- b) Always, at least three [UEA students in room 01.07] are [prepared for the exam]. ( $\nwarrow$ )
- c) Never were there more than three [UEA students] [prepared for the exam]. ( $\searrow$ )

Lacking any precise contextual information, no contradiction ensues, so we only expect a slight bias towards surface scope. Both scopal readings are available. However, once we get more information, we become, in principle, able to rule out one of the scopal readings.

Let us now look at another set of examples. As before, we give the inferences testing the scope availability of some of these constructions.

12. a) In most of John's classes, he fails exactly three Frenchmen.  
(most > 3), (3 > most)
- b) In all of his classes, John was angry at some/exactly three Frenchmen.  
( $\forall > \exists$ ), ( $\exists > \forall$ )
- surface scope: in most of his classes, John was angry at some Frenchmen or other
  - surface scope implicature: no (particular group of) Frenchmen upset John in most of his classes
  - inverse scope: some Frenchmen upset John in most of his classes
  - *contradiction* between surface scope implicature and inverse scope

A contradiction is also obtained for the numerical case, (12a). I represent the computation in the following figure.

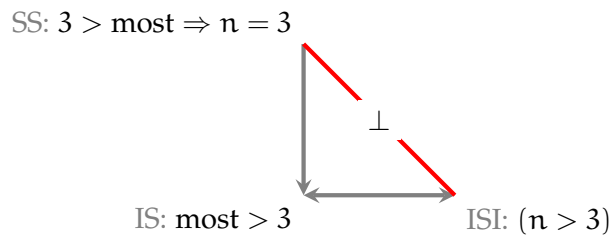


Figure 6.: The surface scope reading and inverse scope implicature are inconsistent

13. c) In every room in John's house, every bottle is in the corner.
- d) In every room in John's house, you can hear a (some) tune.  
[He's got the Sonos multi-room system.] ( $\forall > \exists$ ), ( $\exists > \forall$ )

- surface scope: In every room in John's home, you can hear some tune or other.
  - surface scope implicature: no tune can be heard in every room
  - inverse scope: there is some tune that you can hear in every room
  - *contradiction* between surface scope implicature and inverse scope
14. a) Whatever John does, most of the class falls asleep.
- b) Whatever John does in the class, some people in that class fall asleep. ( $\forall > \exists$ ), ( $\exists > \forall$ )

These cases differ only syntactically from some of the examples previously discussed. This is because they involve surface scope universal (or *most*) quantifiers dominating some sort of existential quantifier. As above, inverse scope is stronger, and thus Scope Admissibility allows it, and given that the inconsistency is obtained relatively fast, the inverse scope has some degree of saliency.

# E | LINGUISTIC SURVEY

I present the results of a linguistic survey run on-line, through the Amazon's Mechanical Turk platform. The results mostly corroborate the main thesis of chapter 2. In what follows, I describe how the survey was introduced to the informants and then present the survey itself. To keep this appendix short, I skip over some parts of the survey. In particular, I omit the preliminary questions asking the informants to attest that they are native speakers of English, some additional examples given in the instructions, as well as the filler questions in the survey.

**ABOUT THE EXPERIMENT** The linguistic experiment consists of a questionnaire (survey), preceded by a list of instructions which explain how to complete the questionnaire. The questionnaire contains 42 sentences that must be evaluated or ranked by native speakers of English. Each informant is paid \$3 for reading the instructions and completing the questionnaire, which takes about 20 minutes overall.

*What to do and how to do it?*

**TASK** Each of the tasks involves a little *story* and one or more corresponding *sentences*. To do the tasks, make sure you:

1. understand the little story
2. understand the sentences coming after the story, including the possible ways of interpreting these sentences
3. evaluate the sentences in the context of the story, that is, *rank each sentence on a scale from 1-7 according to its compatibility with the story*.

**RANKING OF SENTENCES** The ranking of sentences is the essential part of the experiment. The worst sentences are ranked 1 and the perfectly good ones are ranked 7. Of course, you may use any other number between 1-7 to rank the sentences, according to how bad/good a sentence appears to be. The higher the number, the better the sentence!

**EXAMPLES OF STORIES AND SENTENCES** To give you an idea about how to rank sentences, here are several examples of very bad and very good sentences in the context of specific little stories.



**Typographical conventions** The story is written in normal font. The sentences to be evaluated are written in monospaced font. To draw your attention to a particular expression in a sentence we will wrap the expression in stars, like so: \*expression\*. Our few comments and guidelines are displayed in *italic fonts*.

**Example 1** John likes fishing and in the last vacation he went fishing in three different creeks (creek<sub>1</sub>, creek<sub>2</sub>, and creek<sub>3</sub>). He caught three fish: one in creek<sub>1</sub>, another one in creek<sub>2</sub>, and yet another one in creek<sub>3</sub>. So, are the following proper ways of describing the situation?

- (1) John caught a fish in three creeks. [1] Matthewson (2004, p. 408)
- (2) John caught a fish in each creek. [7]

*Note: Evaluate a sentence **only** in its context, that is, as part of the little story. Take sentence (1): “John caught a fish in three creeks”. If you interpret sentence (1) outside its context, it will be good from a grammatical point of view (albeit implausible, because it implies that John caught the very same fish in each of the creeks). But in the context of the story, it is really bad because the story tells us that John caught three fish (not just one, as sentence (1) implies). So sentence (1) receives grade [1]. On the other hand, sentence (2) is very good and fits perfectly well the context, and so gets the highest grade, [7].*

*We should say that the evaluation of sentences is **flexible**: some people will feel that they want to give a [2] to sentence (1) and a [6] to sentence (2). That’s all right! What’s unacceptable for most native speakers of English is to rank (1) above (2).*

*Also, note that (2) is considered perfectly good even if it’s not as explicit as it could be: it says that John caught a fish in each creek, leaving it implicit that it is about each of the \*three\* creeks mentioned in the story. So we are not interested in how comprehensive the information conveyed by a sentence is, but only in its degree of compatibility with the context, assuming it is not altogether misleading. As long as the sentence is compatible with the context, and the information it conveys is not misleading, it should be as good as a more explicit or comprehensive sentence (compatible with the context).*

**Bottom-line** Each sentence is preceded by a little story. Always evaluate sentences in the context of the given story. The evaluation is somewhat flexible. However, do not hesitate to give 7s and 1s if the sentences do (or don’t) make sense to you in their context. Finally, it’s not important whether the sentences are fully informative. What really matters is the compatibility of the sentences with the story/context, provided that they are not misleading in that context.

#### KEY GUIDELINES FOR EVALUATION

- we are *not* interested in whether these sentences would be graded highly by a writing teacher, or whether they mesh with the rules of grammar you learned in school.

- *nor* do we care about the style or clarity of the sentences, or about their being fully informative. We are interested only in whether you think that these sentences are informative enough and sound right to you in their contexts.
- we are interested in the evaluation of each sentence on its own, rather than in whether there are better alternative ways of saying the same thing. So if you have to evaluate a sentence *S*, we want you to judge how good *S* is (in its context), rather than how good *S* is compared to another sentence *S'* (that might be used in the same context).
- finally, this experiment is not designed to be a memory test or any other way of measuring your abilities. So just tell us if you find the sentences acceptable in regular conversation.

### *The questionnaire*

*Please evaluate the following sentences in the context of their stories.*

**Story 1** Some time ago, John had to meet my students, but he was not able to do so because he was sick. The students didn't get to meet John. *Do the following express well what happened in the story?*

- (3) John didn't meet every student of mine.
- (4) John didn't meet all my students.

**Story 2** Yesterday, John was able to come to meet my students, and he did. However, several students were not able to make it, and they didn't show up to the meeting. *How good are the following sentences?*

- (5) Every student of mine didn't show up.
- (6) All my students didn't show up.

**Story 3** Bill the doctor had to see the students after John met them. But the students were too tired after the meeting with John, and didn't show up at the meeting with Bill. So Bill didn't get to see the students. *Is this situation correctly depicted by the following sentence?*

- (7) One student didn't show up to meet Bill.

**Story 4** On each floor of the university building A, there are many windows (say 23). On each day of the week, someone opens the windows on one—and only one—floor. *Is the following the right thing to say?*

- (8) Many windows are always open in this building.

**Story 5** On each floor of the university building B, there are very few windows (say 3). On each day of the week, someone opens the windows on one—and only one—floor. *Is the following sentence right in this context?*

- (9) Few windows are always open in this building.

**Story 6** Let's imagine that the twelve apostles had a very small number of things which were common property; that is, the apostles shared a very low number of things (say three silver coins). *Are the following assertions right?*

- (10) Every apostle had few things.  
(11) All apostles had few things.

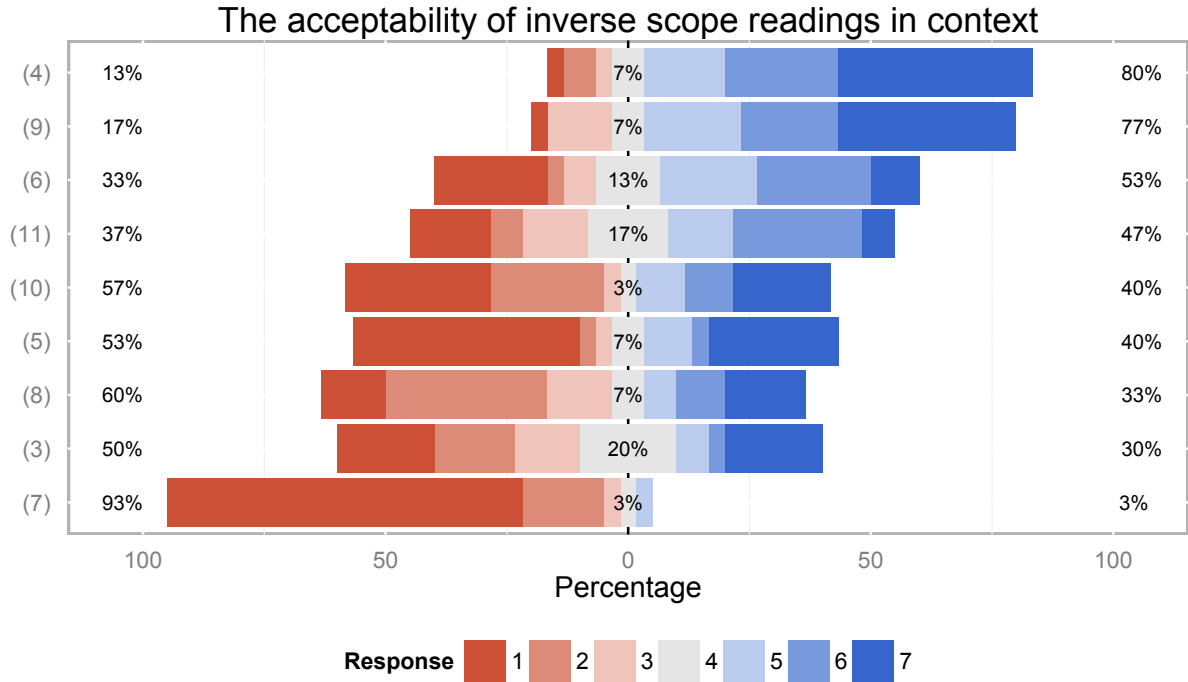
#### *Results and interpretation*

I collected responses from thirty informants, all self-avowed native speakers of English. As shown above, a task consists of reading a little story and then assessing sentences in the context of the story, using a scale from 1-7 (1 means very bad, and 7 means very good). The aim of this set up is to verify if the inverse scope readings of several sentences are available. And the stories are meant to make salient the inverse scope readings of the sentences to be evaluated.

We expect sentences which exhibit scopal flexibility to be maximally compatible with contexts requiring the inverse scope reading. As we can see, all the sentences but one can be made compatible with the context, and this suggests that they admit inverse scope readings, and thus are scopally flexible. (Note that these sentences are the constructions (37a), (37b), (40), (42a), (42b), and (47) of chapter 2, and are also the equivalents of the constructions (8)-(10) of chapter 1.)

The results are summarised in the figure below. Red designates the proportion of informants that found the inverse scope of the corresponding sentence to be bad in context (and thus ranked the sentence between 1-3). The exact percentages are given on the left-hand side. Blue designates the proportion of informants that found the inverse scope of the corresponding sentence to be good (ranked 5-7), and the percentages are given on the right-hand side. We assume that if 30% or more of the informants found a sentence good under its inverse scope interpretation, then the inverse scope is indeed available.

What the graph shows is that an important percentage of our informants find most sentences in our pull compatible with the context. (The only exception is *One student didn't show up to meet Bill.*) Under our assumptions, this means that these informants grasp the inverse scope readings of the relevant sentences. This offers provisional support for the thesis that scopal flexibility is a less restricted phenomenon than several theorists have thought.



For convenience, I repeat the main sentences here, following the increasing order of acceptability of their inverse scope, as they appear in the graph.

- (4) John didn't meet all my students. cf. (3)
- (9) Few windows are always open in this building.  $\approx$  (42b), (10b)
- (6) All my students didn't show up. cf. (5)
- (11) All apostles had few things. cf. (10)
- (10) Every apostle had few things.  $\approx$  (42b)
- (5) Every student of mine didn't show up.  $\approx$  (37a), (8a)
- (8) Many windows are always open in this building.  $\approx$  (42a), (10a)
- (3) John didn't meet every student of mine.  $\approx$  (37b), (8b)
- (7) One student didn't show up to meet Bill.  $\approx$  (40), (9)

I do not claim that these results are definitive. Much more work (both experimental and conceptual) should go into establishing the scopal properties of doubly quantified sentences. For the moment, we have to content ourselves with these suggestive results.

I would like to single out one methodological problem posed by this survey. One important challenge is to establish that compatibility of a sentence with a context really tracks the inverse scope of that

sentence. My interpretation of the data assumed that this is the case, and a corresponding (definitional) assumption went into my notion of scope. However, an alternative interpretation of our experimental data may run as follows. When the story (linguistic context) and the sentence are taken in conjunction, they constrain what is conversationally taken for granted *without* actually producing any constraint on the logical form of the sentence, i.e., without requiring the instantiation of an inverse scope logical form.

My provisional strategy of response to this challenge is to define scope in terms of notions that are more transparent than that of logical form. On my conception of scope, scopal properties are just logical properties defined in terms of entailment and (in)compatibility with context, rather than the special linear ordering of quantifiers. (In chapter 2, I referred to this as a more pragmatic notion of scope. It is also a more deflationary notion of scope.) This is more transparent because the patterns of entailment (compatibility, and incompatibility) of sentences, are easier to test than their elusive logical form. I am aware that this notion of scope is not everyone's notion of scope. However, an argument to the effect that the previously mentioned methodological issue can be solved by assuming my deflationary notion of scope should be left for another occasion.

I contend that there are four ways of defining a notion of logical consequence (and more generally logicality properties), which are consistent with the absolute model constraint.

1. *Pre-semantic Solution.* Take a frame<sup>1</sup> to be the fixed domain  $D_a$  of an absolute model  $\mathcal{M}_a$ , with a specified vocabulary  $V$ . Thus, the frame will leave open which of all the possible valuations  $I_i$  in  $F$  (i.e., the set of possible functions taking us from symbols in  $V$  to objects in  $D_a$ , respecting semantic categories<sup>2</sup>) is the absolute valuation  $I_a$ . We can now take in sentences and test them under arbitrary possible valuations  $I_i$  before attributing them (or independently of attributing them) their absolute values supplied by the absolute valuation  $I_a$ . (This generates a set of validities which, together with the sentences generated by the absolute semantics, give rise to further inferences.)

This strategy fits the (BE) hypothesis very well. This is because e.g. we don't have to know who Claudine is (i.e. who is its fixed semantic value) in order to be able to evaluate the grammaticality of *She is Claudine* using the (BE) mechanism. Thus, the logical computation of sentences in Principle C configurations may precede at pre-semantic level before even considering the absolute valuation and model. That is, we are free to use the entire space of valuations to define whatever logical properties we need, including the one underlying (BE).

2. *Post-semantic Solution.* Suppose that we don't have the liberty of doing the previous move. That is, we already have in place a fixed, absolute valuation  $I_a$ , and the domain making up the absolute model  $\mathcal{M}_a$ . In this case, to get logicality we can generalise from  $I_a$  to arbitrary possible  $I_i$ s. We can see the generalisation as follows. First we write the valuations functions  $I_i$  as binary relations  $R_i$  in  $D_a \times V$ . Accordingly, if the absolute valuation took us from symbol  $v_1$  in  $V$  to object  $d_1$  in  $D$ , then, in terms

<sup>1</sup> See Patrick Blackburn, de Rijke, and Venema (2001) on the definition of logical consequences in modal logic at the level of frames (relational structures, without a valuation). Here, as in the modal logic case, *frame* marks the fact that no reference to models is made in defining logical consequences; we abstract away from the contingent information introduced by models.

<sup>2</sup> The set  $F$  is thus the set  $\{I_i : A \rightarrow B \mid A \subseteq V \& B \subseteq D\}$  of possible functions from subsets of  $V$  to subsets of  $D$ .

of relations, we write  $Rv_1d_1$ . Let us suppose that some such unique relation is realised by the grammar (broadly speaking). Now, the generalisation is based on a *systematicity* assumption, to the effect that whoever can form  $Rv_1d_1$ , can also form  $Rv_1d_2$ ,  $Rv_2d_1$  etc. respecting semantic restrictions (e.g. individual constants will be related only to individuals in  $D_a$ ). Provided that it is not implausible to think that our cognition is systematic, we thus can get a space of models at post-semantic level, starting with the resources made available by the absolute semantics.

This is akin to saying that the competent speakers can entertain the possibility of things being named differently than they actually are or of predicates having different extensions. As far as the (BE) hypothesis is concerned, the way we call the individuals in the domain and the extensions of the lexical items are immaterial to the grammaticality verdict given by the (BE) mechanism, which shows that this post-semantic solution is compatible with the (BE) hypothesis.

Another plausible way to interpret the post-semantic view is to divorce it from what cognitive systems can do. Firstly, what is important for explanatory purposes is whether some judgments of acceptability can be explained in terms of logicity defined post-semantically. Secondly, the knowledge we have about what a cognitive system can do is very partial, and is not a direct concern of the semanticist. According to this interpretation, formulating a semantics at a more abstract level than the cognitive one is entirely acceptable.

3. *Semantic Solution.* A third possibility of getting invariance properties doesn't require tweaking the valuation functions at all, as both the above solutions did. We can get a space of models out of an absolute model  $M_a, \langle D_a, I_a \rangle$ , simply by splitting the model in smaller, disjoint sub-models.<sup>3</sup> These sub-models will be absolute, by the absolute semantics lights – all truth-conditions will be given with respect to parts of the real world. We can then extend our absolute sub-models by adding to each of them the logical sentences we want to test. Sentences true in all sub-models will be valid. Thus, we may simulate a space of models only based on decomposing the absolute model. This proposal is perhaps most attractive as a model of how competent speakers carve out the universes of discourse (domains) they are speaking about. In effect, speakers rarely talk about the whole universe of discourse, about all the objects in the domain. The domain is most of the time restricted contextually to a subset of the whole domain (the domain of the alleged ab-

<sup>3</sup> For the discussion of the similar operation of sub-model generation in modal logic see Patrick Blackburn, de Rijke, and Venema (2001, 55ff.).



solute semantics). For instance, imagine the conditional *if all dogs are asleep, then some dogs are asleep* being uttered multiple times, in different contexts, about different dogs. The different dogs the utterances are about determine different models for the utterance-tokens. If we formulate a context-sensitive semantics (truth-conditions) for this sentence, we shall be able to classify the above inference as a logical-truth (or equivalently as a logical consequence), since it is true (or preserves truth) in all possible (contextually given) models. These models will be sub-models of the absolute model. Likewise, we can define logical properties for any other natural language sentence deemed a valid inference.

4. *Proof-theoretic Solution.* Perhaps the most minimal solution is to rely on a syntactic way of conceiving of logicity. The proof-theoretic system needed will depend, of course, on the job at hand. For the purposes of Binding Economy, our implementation needs the standard first-order deductive system, as suggested. Thus, within the logical computation required by Binding Economy, all we need is to see if the specific abstracted logical forms (neglecting lexical material) are instances of  $\forall xy (Bxy \wedge x = y) \vdash \forall x Bxx$ . If they are, the coreference and binding readings are equivalent, and the coreference reading is grammatically licensed. But if the logical forms are not instance of that formula, their coreference and binding readings are difference, and the binding reading is allowed. (Given that the first order logic is sound, we automatically get the connection with the semantic ways of conceiving of logical consequence and validity.)

The first three ways of sketching a model theoretic view compatible with the absolute semantic desiderata—(1)-(3)—exploit the flexibility of the notion of a model for natural language. This flexibility may well reflect the flexibility of linguistic competence.

From the point of view of absolute/exclusive semantics, the syntactic view of logical formality in natural language (4) is the less intrusive, since it does not need models in order to define logicity. This solution was suggested by both linguistic and philosophical accounts (see fn. 17).

## BIBLIOGRAPHY

- Abney, Steven (1987). “The English noun phrase in its sentential aspect”. PhD thesis. Cambridge, Mass.: MIT (cit. on p. 214).
- Aloni, Maria (2005). “Individual concepts in modal predicate logic”. *Journal of Philosophical Logic* 34.1, pp. 1–64. DOI: 10.1007/s10992-004-4065-8 (cit. on p. 145).
- Alrenga, Peter and Christopher Kennedy (2014). “No more shall we part: Quantifiers in English comparatives”. *Natural Language Semantics* 22, pp. 1–53. DOI: 10.1007/s11050-013-9099-4 (cit. on pp. 43–47).
- Altshuler, Daniel (2007). “WCO, ACD and what they reveal about complex demonstratives”. *Natural Language Semantics* 15, pp. 265–277. DOI: 10.1007/s11050-007-9018-7 (cit. on p. 213).
- Anand, Pranav (2006). “De de se”. PhD thesis. Massachusetts Institute of Technology. URL: <http://hdl.handle.net/1721.1/37418> (cit. on pp. 93, 129, 130).
- (2007). “Dream report pronouns, local binding, and attitudes De Se”. In: *Proceedings from SALT XVII*. Ed. by T. Friedman and M. Gibson. Ithaca, NY: Cornell University, pp. 1–18 (cit. on pp. 92, 93, 130, 133, 134, 136).
- Aoun, Joseph (1985). *A grammar for anaphora*. Cambridge, Mass.: MIT Press (cit. on p. 84).
- Barwise, Jon and Robin Cooper (1981). “Generalized quantifiers and natural language”. *Linguistics and Philosophy* 4, pp. 159–219 (cit. on pp. 183–185).
- Beaver, David I. (2001). *Presupposition and assertion in dynamic semantics*. Stanford: CSLI Publications. URL: <https://webSPACE.utexas.edu/dib97/silli.pdf> (cit. on p. 12).
- Beaver, David I. and Bart Geurts (2011). “Presupposition”. In: *The Stanford Encyclopedia of Philosophy*. Ed. by Edward N. Zalta. Summer 2011 (cit. on p. 12).
- Beghelli, Filippo and Tim Stowell (1997). “Distributivity and negation: the syntax of each and every”. In: *Ways of scope taking*. Ed. by Anna Szabolcsi. Vol. 65. Springer Netherlands, pp. 71–107 (cit. on pp. 27, 58, 61, 62, 184, 255, 263).
- Bhatt, Rajesh and Shoichi Takahashi (2011). “Reduced and unreduced phrasal comparatives”. *Natural Language and Linguistic Theory* 29, pp. 581–620 (cit. on p. 46).
- Bittner, Maria (2001). “Surface composition as bridging”. *Journal of Semantics* 18, pp. 127–177 (cit. on p. 143).

- Blackburn, P. and W. Meyer-Viol (1997). "Modal Logic and Model-Theoretic Syntax". In: *Advances in Intensional Logic*. Ed. by Maarten de Rijke. Kluwer Academic Publishers (cit. on p. 188).
- Blackburn, Patrick, Maarten de Rijke, and Yde Venema (2001). *Modal Logic*. Cambridge, UK: Cambridge University Press (cit. on pp. 273, 274).
- Boolos, George S., John P. Burgess, and Richard C. Jeffrey (2007). *Computability and Logic*. Fifth Edition. Cambridge, UK: Cambridge University Press.
- Brandom, Robert (2008). *Between saying and doing: towards an analytic pragmatism*. Oxford University Press (cit. on pp. 72, 247).
- Braun, David (2008a). "Complex demonstratives and their singular content". *Linguistics and Philosophy* 31, pp. 57–99. DOI: [10.1007/s10988-008-9032-3](https://doi.org/10.1007/s10988-008-9032-3) (cit. on p. 229).
- (2008b). "Persisting problems for a quantificational theory of complex demonstratives". *Philosophical Studies* 141, pp. 243–262 (cit. on pp. 197, 210).
- Brogaard, Berit (2007). "Descriptions: predicates or quantifiers?" *Australasian Journal of Philosophy* 85.1, pp. 117–136. DOI: <http://dx.doi.org/10.1080/00048400601185495> (cit. on p. 256).
- Bromberger, Sylvain (2012). "Vagueness, ambiguity, and the "sound" of meaning". In: *Analysis and Interpretation in the Exact Sciences*. Netherlands: Springer, pp. 75–93 (cit. on p. 105).
- Büring, Daniel (2005). *Binding Theory*. Cambridge, UK: Cambridge University Press (cit. on pp. 92, 121, 158, 216, 220).
- Cappelen, Herman and Josh Dever (2013). *The inessential indexical*. Oxford, UK: Oxford University Press (cit. on p. 135).
- Carnie, Andrew (2007). *Syntax. A Generative Introduction*. Second edition. Oxford: Blackwell Publishing (cit. on pp. 6, 105).
- Carpenter, Bob (1997). *Type-Logical Semantics*. Cambridge, Mass.: MIT Press (cit. on p. 158).
- Cecchetto, Carlo (2000). "Connectivity and anti-connectivity in pseudoclefts". In: *Proceedings NELS*. Vol. 30, pp. 137–152 (cit. on p. 98).
- Chierchia, Gennaro (1989). "Anaphora and attitudes "de se"". In: *Semantics and Contextual Expressions*. Ed. by Renate Bartsch, Johan van Benthem, and Peter van Emde Boas. Dordrecht: Foris, pp. 1–31 (cit. on p. 92).
- (2004). "Scalar Implicatures, Polarity Phenomena, and the Syntax-Semantics Interface". In: *Structures and Beyond*. Ed. by A. Belletti. Oxford: Oxford University Press (cit. on pp. 23, 75).
- (2013). *Logic in grammar. Polarity, free choice, and intervention*. Oxford: Oxford University Press (cit. on pp. 16, 17, 72, 74, 158, 173, 177, 248).
- Chierchia, Gennaro, Danny Fox, and Benjamin Spector (2008). "The grammatical view of scalar implicatures and the relationship be-

- tween semantics and pragmatics". URL: <http://ncs.ruhosting.nl/bart/talks/lot2009/chierchia2008.pdf> (cit. on pp. 12, 24).
- Chierchia, Gennaro and Sally McConnell-Ginet (2000). *Meaning and grammar : an introduction to semantics*. 2nd ed. Cambridge, Mass: MIT Press (cit. on p. 150).
- Chomsky, Noam (1957). *Syntactic Structures*. The Hague: Mouton (cit. on pp. 9, 188).
- (1965). *Aspects of the Theory of Syntax*. Cambridge Mass.: MIT Press (cit. on p. 9).
- (1973). "Conditions on Transformations". In: *A Festschrift for Morris Halle*. Ed. by Stephen Anderson and Paul Kiparsky. New York: Holt, Reinhart and Winston (cit. on p. 5).
- (1981). *Lectures on Government and Binding: The Pisa Lectures*. Dordrecht: Foris (cit. on pp. 9, 87, 88, 152).
- (1995). *The Minimalist Program*. Cambridge Mass.: MIT Press (cit. on pp. 9, 10, 18, 88, 102, 155, 162, 186).
- Collins, Chris and Paul M. Postal (2012). *Imposters: a study of pronominal agreement*. Cambridge, Mass.: MIT Press (cit. on pp. 121, 127, 128).
- Collins, John (2007). "Syntax, More or Less". *Mind* 116.464, pp. 805–850. DOI: [10.1093/mind/fzm805](https://doi.org/10.1093/mind/fzm805) (cit. on p. 140).
- (2011). *The unity of linguistic meaning*. Oxford, UK: Oxford University Press (cit. on p. 188).
- (2013). "Cutting it (too) fine". *Philosophical Studies*, pp. 1–30. DOI: [10.1007/s11098-013-0163-1](https://doi.org/10.1007/s11098-013-0163-1) (cit. on p. 220).
- Dever, Josh (2001). "Complex demonstratives". *Linguistics and Philosophy* 24.3, pp. 271–330. DOI: [10.1023/A:1010730709736](https://doi.org/10.1023/A:1010730709736) (cit. on pp. iv, 195–197, 202).
- Dutilh Novaes, Catarina (2013). "A dialogical account of deductive reasoning as a case study for how culture shapes cognition". *Journal of Cognition and Culture* 13, pp. 459–482. DOI: [10.1163/15685373-12342104](https://doi.org/10.1163/15685373-12342104) (cit. on p. 78).
- Elbourne, Paul (2005). *Situations and Individuals*. Cambridge, Mass.: MIT Press (cit. on pp. 14, 193, 216, 231, 232).
- (2008). "Demonstratives as Individual Concepts". *Linguistics and Philosophy* 31, pp. 409–66. DOI: [10.1007/s10988-008-9043-0](https://doi.org/10.1007/s10988-008-9043-0) (cit. on pp. iv, 13, 14, 192, 193, 216, 232).
- (2013). *Definite descriptions*. Oxford, UK: Oxford University Press (cit. on pp. iv, 14, 122, 193, 232).
- Etchemendy, John (1990/1999). *The Concept of Logical Consequence*. Stanford, Calif.: CSLI Publications (cit. on p. 150).
- Evans, Gareth (1980). "Pronouns". *Linguistic Inquiry* 11, pp. 337–62 (cit. on pp. 88, 152, 223).
- (1985). *Collected Papers*. Oxford University Press (cit. on p. 170).
- Fălăuș, Anamaria (2014). "(Partially) Free choice of alternatives". *Linguistics and Philosophy* 37.2, pp. 121–173 (cit. on p. 158).

## Bibliography

- Fara, Delia Graff (2001). "Descriptions as Predicates". *Philosophical Studies* 102. Originally published under the name 'Delia Graff', pp. 1–42. DOI: [10.1023/A:1010379409594](https://doi.org/10.1023/A:1010379409594) (cit. on p. 232).
- (2013). ""Literal" Uses of Proper Names". ms. Princeton. URL: <http://www.princeton.edu/~dfara/papers/fara-literal.html> (cit. on p. 232).
- Fox, Danny (2000). *Economy and Semantic Interpretation*. Cambridge Mass.: MIT Press (cit. on pp. ii, iii, 8, 10, 17, 23–25, 38, 52, 92, 101, 106–109, 158, 170, 197, 198, 200, 211, 213, 233, 235).
- Frege, Gottlob (1997). *The Frege Reader*. Ed. by Michael Beaney. Oxford, UK: Blackwell Publishing (cit. on p. 217).
- Frigg, Roman and Stephan Hartmann (2012). "Models in Science". In: *The Stanford Encyclopedia of Philosophy*. Ed. by Edward N. Zalta. Vol. Fall 2012. URL: <http://plato.stanford.edu/archives/fall2012/entries/models-science/> (cit. on pp. 181, 182).
- Gajewski, Jon (2002). "L-analiticity and natural language". ms. MIT. URL: <http://www.gajewski.uconn.edu/papers/analytic.pdf> (cit. on pp. 17, 72, 158, 185).
- (2009). "L-triviality and grammar". ms. UConn Logic Group. URL: <http://www.gajewski.uconn.edu/papers/Logic.pdf> (cit. on p. 158).
- Gamut, L. T. F. (1991). *Logic, language, and meaning. Volume II, Intensional logic and logical grammar*. Chicago; London: University of Chicago Press (cit. on p. 150).
- Glanzberg, Michael (2007). "Definite descriptions and quantifier scope: some Mates cases reconsidered". *European Journal of Analytic Philosophy* 3.2, pp. 133–158 (cit. on p. 212).
- (2008). "Descriptions, negation, and focus". In: *Compositionality, Context, and Semantic Values*. Ed. by R. Stainton and C. Viger. Springer Netherlands, pp. 193–220. DOI: [10.1007/978-1-4020-8310-5](https://doi.org/10.1007/978-1-4020-8310-5) (cit. on p. 197).
- (forthcoming[a]). "Explanation and partiality in semantic theory". In: *Metasemantics: new essays on the foundations of meaning*. Ed. by Alexis Burgess and Brett Sherman. Oxford, New York: Oxford University Press. URL: <http://tinyurl.com/glanzberg-disquotation> (cit. on p. 162).
- (forthcoming[b]). "Logical Consequence and Natural Language". ms. Northwestern University. URL: <http://tinyurl.com/glanzberg-consequence-language> (cit. on pp. iv, 160–163, 165, 170, 172, 175, 177, 181, 183, 186, 187).
- Grice, Paul H. (1967/1989). *Studies in the Way of Words*. Cambridge, Mass.: Harvard University Press. (cit. on pp. ii, 2, 24, 53, 54, 58, 119, 150, 207).
- Grodzinsky, Yosef and Tanya Reinhart (1993). "The innateness of binding and coreference". *Linguistic Inquiry* 24, pp. 69–101 (cit. on p. 98).

## Bibliography

- Hackl, Martin (2000). "Comparative Quantifiers". PhD thesis. Massachusetts Institute of Technology (cit. on pp. 28, 43–45).
- Haegeman, Liliane (1994). *Introduction to Government and Binding Theory*. Second edition. Cambridge Mass.: Blackwell (cit. on p. 137).
- Hardt, Daniel (1999). "Dynamic interpretation of verb phrase ellipsis". *Linguistics and Philosophy* 22.2, pp. 187–221 (cit. on p. 120).
- Hawthorne, John and David Manley (2012). *The reference book*. Oxford University Press (cit. on pp. 83, 193, 205, 218, 232).
- Heck, Richard G. (2002). "Do demonstratives have senses?" *Philosophers' Imprint* 2.2, pp. 1–33. URL: <http://hdl.handle.net/2027/spo.3521354.0002.002> (cit. on p. 217).
- Hedman, Shawn (2004). *A First Course in Logic*. Oxford, New York: Oxford University Press.
- Heim, Irene (1998). "Anaphora and Semantic Interpretation: A Reinterpretation of Reinhart's Approach". In: *The Interpretive Tract*. Ed. by U. Saurland and O. Percus. Vol. 25. MIT Working Papers in Linguistics, pp. 205–246 (cit. on pp. iv, 12, 92, 101, 113, 119, 145, 158, 216, 219, 221).
- (2000). "Degree operators and scope". In: *Proceedings of SALT*. Ed. by Brendan Jackson and Tanya Matthews. Vol. X. Cornell University. Ithaca, NY, pp. 40–64 (cit. on pp. 34, 43, 45, 208).
- (2006). "Remarks on comparative clauses as generalized quantifiers". ms. MIT (cit. on p. 45).
- (2009). "Forks in the road to rule I". In: *NELS38: Proceedings of the 38th Annual Meeting of the North East Linguistic Society*. Ed. by Martin Walkow, Anisa Schardl, and Muhammad Abdurrahman. Department of Linguistics, University of Massachusetts (cit. on p. 233).
- (2011). "The Semantics of Definite and Indefinite Noun Phrases". PhD thesis. Amherst: University of Massachusetts (cit. on p. 145).
- Heim, Irene and Angelika Kratzer (1998). *Semantics in Generative Grammar*. Oxford: Blackwell Publishing (cit. on pp. 130, 150, 162, 216, 252, 255).
- Higginbotham, James (1985). "On semantics". *Linguistic Inquiry* 16.4, pp. 547–593. URL: <http://www.jstor.org/stable/4178457> (cit. on p. 219).
- (2010). "On words and thoughts about oneself". In: *Context-dependence, perspective and relativity*. Ed. by François Recanati, Isidora Stojanovic, and Neftali Villanueva. Berlin: de Gruyter, pp. 253–282 (cit. on p. 140).
- Hodges, Wilfrid (1997). *A Shorter Model Theory*. Cambridge, UK: Cambridge University Press.
- Horn, Laurence R. (2001). *A Natural History of Negation*. Stanford, Calif.: CSLI Publications (cit. on pp. 23, 211).



- Horn, Laurence R. (2004). "Implicature". In: *The Handbook of Pragmatics*. Ed. by Laurence R. Horn and Gregory Ward. Oxford: Blackwell Publishing, pp. 3–28 (cit. on pp. 12, 23, 54).
- Huang, Yan (2004). "Anaphora and the Pragmatics-Syntax Interface". In: *The Handbook of Pragmatics*. Ed. by Laurence R. Horn and Gregory Ward. Oxford: Blackwell Publishing (cit. on p. 54).
- Jackendoff, Ray (1992). "Mme. Tussaud Meets the Binding Theory". *Language and Linguistic Theory* 10.1, pp. 1–31. URL: <http://www.jstor.org/stable/4047765> (cit. on pp. iii, 113, 122).
- Jaszczolt, Kasia M. (2013). "First-person reference in discourse: aims and strategies". *Journal of Pragmatics* 48, pp. 57–70. DOI: <http://dx.doi.org/10.1016/j.pragma.2012.11.018> (cit. on p. 135).
- Jespersen, Otto (1933). *The system of grammar*. London: G. Allen & Unwin Ltd. (cit. on p. 191).
- Johnson, David E. and Shalom Lappin (1999). *Local Constraints vs. Economy*. Stanford, Calif.: CSLI Publications (cit. on pp. 9, 38, 102, 105, 233).
- Johnson, Kyle (2000). "How far will quantifiers go?" In: *Step by step*. Ed. by David Michaels Roger Martin and Juan Uriagereka. MIT Press, pp. 187–210 (cit. on p. 27).
- Kamp, Hans and Uwe Reyle (1993). *From discourse to logic: Introduction to modeltheoretic semantics of natural language, formal logic and discourse representation theory*. 42. Kluwer Academic Publishers (cit. on p. 150).
- Kaplan, David (1989). "Demonstratives". In: *Themes from Kaplan*. Ed. by J. Perry J. Almog and H. Wettstein. Oxford: Oxford University Press, pp. 481–563 (cit. on p. 192).
- Keenan, Edward L. (2001). "Logical objects". In: *Logic, Meaning and Computation. Essays in Memory of Alonzo Church*. Ed. by Curtis Anthony Anderson Alonzo Church and Michael Zelëny. Amsterdam: Springer (cit. on p. 172).
- Kehler, Andrew (2002). *Coherence, reference and the theory of grammar*. Stanford: CSLI Publications (cit. on p. 120).
- Kehler, Andy (1993). "A discourse copying algorithm for ellipsis and anaphora". In: *Proceedings to EACL*. Association for Computational Linguistics, Morristown, N.J. (cit. on pp. 110, 111, 115).
- Kennedy, Christopher (1997). "Antecedent-contained deletion and the syntax of quantification". *Linguistic Inquiry* 28.4, pp. 662–688. URL: <http://www.jstor.org/stable/4178999> (cit. on p. 40).
- King, Jeffrey C. (2001). *Complex Demonstratives: A Quantificational Account*. Cambridge, Mass.: MIT Press (cit. on pp. 192, 213, 231, 232).
- (2008). "Complex demonstratives as quantifiers: objections and replies". *Philosophical Studies* 141.2, pp. 209–242. DOI: [10.1007/s11098-008-9238-9](https://doi.org/10.1007/s11098-008-9238-9) (cit. on p. 210).
- (2013). "On fineness of grain". *Philosophical Studies* 163.3, pp. 763–781. DOI: [10.1007/s11098-011-9844-9](https://doi.org/10.1007/s11098-011-9844-9) (cit. on p. 220).



- Kratzer, Angelika (2012). *Modals and Conditionals*. Oxford: Oxford University Press. DOI: [10.1093/acprof:oso/9780199234684.001.0001](https://doi.org/10.1093/acprof:oso/9780199234684.001.0001) (cit. on p. 17).
- (2014). “Situations in Natural Language Semantics”. In: *The Stanford Encyclopedia of Philosophy*. Ed. by Edward N. Zalta. Spring 2014. URL: <http://plato.stanford.edu/archives/spr2014/entries/situations-semantics/> (cit. on p. 122).
- Kripke, Saul A (1980). *Naming and necessity*. Oxford: Blackwell (cit. on p. 203).
- Kuno, Susumu (1987). *Functional syntax: Anaphora, discourse and empathy*. University of Chicago Press (cit. on pp. 113, 115, 125, 126, 200).
- Lakoff, George (1971). “On generative semantics”. In: *Semantics: An interdisciplinary reader in philosophy, linguistics and psychology*. Ed. by Danny D. Steinberg and Leon A. Jakobovits. Cambridge University Press, pp. 232–296 (cit. on p. 9).
- (1972). “Linguistics and natural logic”. In: *Semantics of natural language*. Ed. by Donald Davidson and Gilbert Harman. Dordrecht: Reidel, pp. 545–665 (cit. on p. 92).
- Lepore, Ernest (1983). “What model theoretic semantics cannot do?” *Synthese* 54, pp. 167–187 (cit. on p. 162).
- Levinson, Stephen C. (2000). *Presumptive Meanings: The Theory of Generalized Conversational Implicature*. Cambridge Mass.: MIT Press (cit. on pp. 23, 54, 58, 117, 132, 141, 143, 243).
- MacFarlane, John (2000). “What Does It Mean to Say that Logic Is Formal?” PhD thesis. University of Pittsburg (cit. on pp. 166, 170).
- Mancosu, Paolo (2010). “Fixed- versus variable-domain interpretations of Tarski’s account of logical consequence”. *Philosophy Compass* 5.9, pp. 745–759. DOI: [10.1111/j.1747-9991.2010.00324.x](https://doi.org/10.1111/j.1747-9991.2010.00324.x) (cit. on p. 164).
- Matthewson, Lisa (2004). “On the methodology of semantic field-work”. *International Journal of American Linguistics* 70, pp. 369–415. URL: <http://www.jstor.org/stable/10.1086/429207> (cit. on p. 268).
- Matushansky, Ora (2008). “On the Linguistic Complexity of Proper Names”. *Linguistics and Philosophy* 21.5, pp. 573–627 (cit. on p. 232).
- Mayr, Clemens and Benjamin Spector (2010). “Not too strong! Generalizing the Scope Economy condition”. In: *Proceedings of Sinn und Bedeutung*. Ed. by Viola Schmitt Martin Prinzhorn and Sarah Zobel. Vol. 14 (cit. on pp. ii, 23–25, 29, 32, 37, 47, 52, 184, 211).
- Mikkelsen, Line (2011). “Copular clauses”. In: *Semantics: an international handbook of natural language meaning*. Ed. by Claudia Maienborn, Klaus von Heusinger, and Paul Portner. Vol. 2. Mouton de Gruyter, pp. 1805–1829 (cit. on p. 94).
- Miyagawa, Shigeru (2011). “Optionality”. In: *The Oxford handbook of linguistic minimalism*. Ed. by Cedric Boeckx. Oxford University Press, pp. 354–376 (cit. on pp. 27, 262).

## Bibliography

- Montague, Richard (1974). *Formal philosophy*. Ed. by Richmond H Thomason. New Haven Conn.: Yale University Press (cit. on p. 150).
- Nasta, Andrei (2013). "A guide to binding economy". *Croatian Journal of Philosophy* 38, pp. 313–336 (cit. on pp. 9, 112).
- Neale, Stephen (1990). *Descriptions*. Cambridge, Mass.: MIT Press (cit. on pp. 192, 196, 232).
- (1993). "Term Limits". *Philosophical Perspectives* 7. Language and Logic, pp. 89–123. URL: <http://www.jstor.org/stable/2214117> (cit. on p. 195).
- (2007). "Heavy Hands, Magic, and Scene-Reading Traps". *European Journal of Analytic Philosophy* 3.2, pp. 77–132 (cit. on p. 140).
- Ninan, Dilip (2010). "De se attitudes: ascription and communication". *Philosophy Compass* 5.7, pp. 551–567. DOI: [10.1111/j.1747-9991.2010.00290.x](https://doi.org/10.1111/j.1747-9991.2010.00290.x) (cit. on p. 129).
- Nunberg, Geoffrey (1993). "Indexicality and Deixis". *Linguistics and Philosophy* 16.1, pp. 1–43. DOI: [10.1007/BF00984721](https://doi.org/10.1007/BF00984721) (cit. on p. 13).
- Percus, Orin and Uli Sauerland (2003). "On the LFs of attitude reports". In: *Proceedings of Sinn und Bedeutung*. Vol. 7. Konstanz: Universität Konstanz, pp. 228–242 (cit. on pp. 134, 136, 139).
- Pesetsky, David (2000). *Phrasal movement and its kin*. Cambridge, Mass.: MIT Press (cit. on p. 40).
- Phillips, Colin (1996). "Order and structure". PhD thesis. Massachusetts Institute of Technology (cit. on p. 54).
- Potts, Christopher (2001). "Three Kinds of Transderivational Constraint". In: *Syntax at Santa Cruz*. Ed. by S. M. Bhloscaidh. Vol. 3. Linguistics Department, U.C. Santa Cruz, pp. 21–40 (cit. on p. 102).
- (2002). "Comparative Economy Conditions in Natural Language Syntax". (ms. UC Santa Cruz) (cit. on p. 188).
- Priest, Graham (2008). *An Introduction to Non-Classical Logic. From If to Is*. Second edition. Cambridge, UK: Cambridge University Press (cit. on p. 157).
- Pullum, Geoffrey K. (1996). "Nostalgic Views from Building 20". *Journal of Linguistics* 32.1, pp. 137–147 (cit. on p. 9).
- Reinhart, Tanya (1983a). *Anaphora and Semantic Interpretation*. Chicago: Chicago University Press (cit. on pp. iii, 12, 23, 73, 88, 98, 101, 111, 114).
- (1983b). "Coreference and Bound Anaphora: A Restatement of the Anaphora Questions". *Linguistics and Philosophy* 6, pp. 47–88 (cit. on pp. 10, 88, 114).
- (2006). *Interface Strategies: Optimal and Costly Computations*. Cambridge Mass.: MIT Press (cit. on pp. iii, 5, 6, 8, 10–12, 17, 18, 23, 52–54, 75, 101, 102, 109, 111, 113, 140, 153, 155, 158, 170, 216, 221, 233).
- Reuland, Eric (2011). *Anaphora and Language Design*. Cambridge, Mass.: MIT Press (cit. on pp. 110, 233).

- Roelofsen, Floris (2008). "Anaphora Resolved". PhD thesis. ILLC Amsterdam (cit. on p. 233).
- Rothschild, Daniel (2007a). "Presuppositions and scope". *Journal of Philosophy*, pp. 71–106 (cit. on pp. 204, 212, 232).
- (2007b). "The elusive scope of descriptions". *Philosophy Compass* 2.6, pp. 910–927 (cit. on p. 218).
- Russell, Bertrand (1905). "On Denoting". *Mind* 14, pp. 479–493 (cit. on pp. 42, 72, 207).
- Safir, Ken (2004). *The Syntax of Anaphora*. New York: Oxford University Press (cit. on pp. 9, 110, 111, 113, 117, 140).
- (2005). "Person, context and perspective". *Italian Journal of Linguistics (Rivista di Linguistics)* 16.1, pp. 107–153 (cit. on p. 123).
- Sauerland, Uli (2004). "Scalar implicatures in complex sentences". *Linguistics and philosophy* 27.3, pp. 367–391 (cit. on pp. 23, 55, 75).
- Schiffer, Stephen (2005). "Russell's theory of definite descriptions". *Mind* 114.456, pp. 1135–1183. DOI: [10.1093/mind/fzi1135](https://doi.org/10.1093/mind/fzi1135) (cit. on p. 231).
- Schlenker, Philippe (2004). "Minimize Restrictors! (Notes on definite descriptions, Condition C and epithets)". In: *Proceedings of Sinn und Bedeutung*, pp. 385–416 (cit. on p. 128).
- (2005). "Non-Redundancy: Towards a Semantic Reinterpretation of Binding Theory". *Natural Language Semantics* 13, pp. 1–92. DOI: [10.1007/s11050-004-2440-1](https://doi.org/10.1007/s11050-004-2440-1) (cit. on pp. iii, 10, 92, 110, 111, 115–117, 119–121, 126, 127, 145, 158, 216).
- (2011). "Indexicality and De Se Reports". In: *An International Handbook of Natural Language Meaning*. Ed. by Claudia Maienborn, Klaus von Heusinger, and Paul Portner. Vol. Volume 1. Walter de Gruyter, pp. 1573–1601 (cit. on p. 129).
- Schwarzschild, Roger (2008). "The semantics of comparatives and other degree constructions". *Language and Linguistics Compass* 2, pp. 308–331 (cit. on p. 43).
- Seuren, Pieter A.M. (1973). "The comparative". In: *Generative grammar in Europe*. Ed. by Ferenc Kiefer and Nicolas Ruwet. Dordrecht: Reidel, pp. 528–564 (cit. on p. 43).
- Shapiro, Stewart (2002). "Necessity, meaning, and rationality: the notion of logical consequence". In: *A Companion to Philosophical Logic*. Ed. by Dale Jacquette. Oxford: Blackwell Publishers, pp. 227–240 (cit. on p. 170).
- Sharvit, Yael (1999). "Connectivity in specificational sentences". *Natural Language Semantics* 7.3, pp. 299–339. DOI: [10.1023/A:1008390623435](https://doi.org/10.1023/A:1008390623435) (cit. on pp. 94–96, 98–100, 142).
- (2011). "Covaluation and unexpected BT effects". *Journal of Semantics*. DOI: [10.1093/jos/ffq012](https://doi.org/10.1093/jos/ffq012) (cit. on pp. 135, 136, 139).
- Sher, Gila (1996). "Did Tarski Commit 'Tarski's Fallacy'". *Journal of Symbolic Logic* 61, pp. 653–686 (cit. on p. 150).

- Sperber, Dan and Deirdre Wilson (1986/1995). *Relevance: Communication and Cognition*. Oxford: Blackwell (cit. on p. 2).
- Szabó, Zoltan G. (2012). "Against Logical Form". In: *Donald Davidson on Truth, Meaning, and the Mental*. Ed. by G. Preyer. Oxford: Oxford University Press (cit. on pp. iv, 160, 172, 173, 175, 185–187).
- Szabolcsi, Anna (2010). *Quantification*. Cambridge, UK: Cambridge University Press (cit. on p. 83).
- van Benthem, Johan (1989). "Logical Constants Across Varying Types". *Notre Dame Journal of Formal Logic* 30.3 (cit. on p. 172).
- van Gelderen, Elly (2007). "The definiteness cycle in Germanic". *Journal of Germanic Linguistics* 19.4, pp. 275–308 (cit. on p. 214).
- van Rooij, Robert (2008). "Comparatives and quantifiers". In: *Empirical issues in formal syntax and semantics* 7. Ed. by Olivier Bonami and Patricia Cabredo Hofherr. Paris: CSSP, pp. 423–444 (cit. on p. 46).
- von Fintel, Kai (1994). "Restrictions on quantifier domains". PhD thesis. University of Massachusetts Amherst. URL: <http://www.semanticsarchive.net/Archive/jA3N2IwN/> (cit. on p. 15).
- (1995). "The formal semantics of grammaticalisation". In: *NELS 25 Proceedings*. Vol. Volume 2: Papers from the Workshops on Language Acquisition & Language Change, pp. 175–189. URL: <http://web.mit.edu/fintel/www/grammar.pdf> (cit. on p. 163).
- (2004). "Comments on Beaver: Presupposition accommodation and quantifier domains". In: *Context-dependence in the analysis of linguistic meaning*. Ed. by Hans Kamp and Barbara Partee. 405–410. Amsterdam: Elsevier (cit. on p. 35).
- von Fintel, Kai and Sabine Iatridou (2007). "Anatomy of a Modal Construction". *Linguistic Inquiry* 38.3, pp. 445–483 (cit. on p. 255).
- von Stechow, Armin (1984). "Comparing semantic theories of comparison". *Journal of Semantics* 3, pp. 1–77 (cit. on pp. 43, 208).
- Weisberg, Michael (2007). "Three kinds of idealization". *The Journal of Philosophy* 104.12, pp. 639–659 (cit. on p. 182).
- Williams, Edwin (2003). *Representation theory*. Cambridge, Mass.: MIT Press (cit. on p. 123).
- Williamson, Timothy (2007). *The Philosophy of Philosophy*. Oxford: Blackwell Publishing (cit. on p. 161).
- Yalcin, Seth (2013). "Semantics and metasemantics in the context of generative grammar". ms. Berkeley, draft of August 25, 2013 (cit. on p. 163).